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(12) **United States Patent**
Stoops

(10) **Patent No.: US 10,936,087 B2**
(45) **Date of Patent: Mar. 2, 2021**

(54) **KEYBOARD ASSEMBLY**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/779,800**

(22) Filed: **Feb. 3, 2020**

(65) **Prior Publication Data**

US 2020/0174578 A1 Jun. 4, 2020

Related U.S. Application Data

(63) Continuation-in-part of application No. 29/629,850, filed on Dec. 15, 2017, now Pat. No. Des. 874,250, and a continuation-in-part of application No. 29/614,843, filed on Aug. 23, 2017, now Pat. No. Des. 892,597, and a continuation-in-part of application No. 16/505,476, filed on Jul. 8, 2019, now Pat. No. 10,642,374, which is a continuation of application No. 15/599,400, filed on May 18, 2017, now Pat. No. 10,345,920.

(60) Provisional application No. 62/508,048, filed on May 18, 2017, provisional application No. 62/338,428, filed on May 18, 2016.

(51) **Int. Cl.**
G06F 3/02 (2006.01)
H01H 13/702 (2006.01)

(52) **U.S. Cl.**
CPC ***G06F 3/0219*** (2013.01); ***G06F 3/0202*** (2013.01); ***H01H 13/702*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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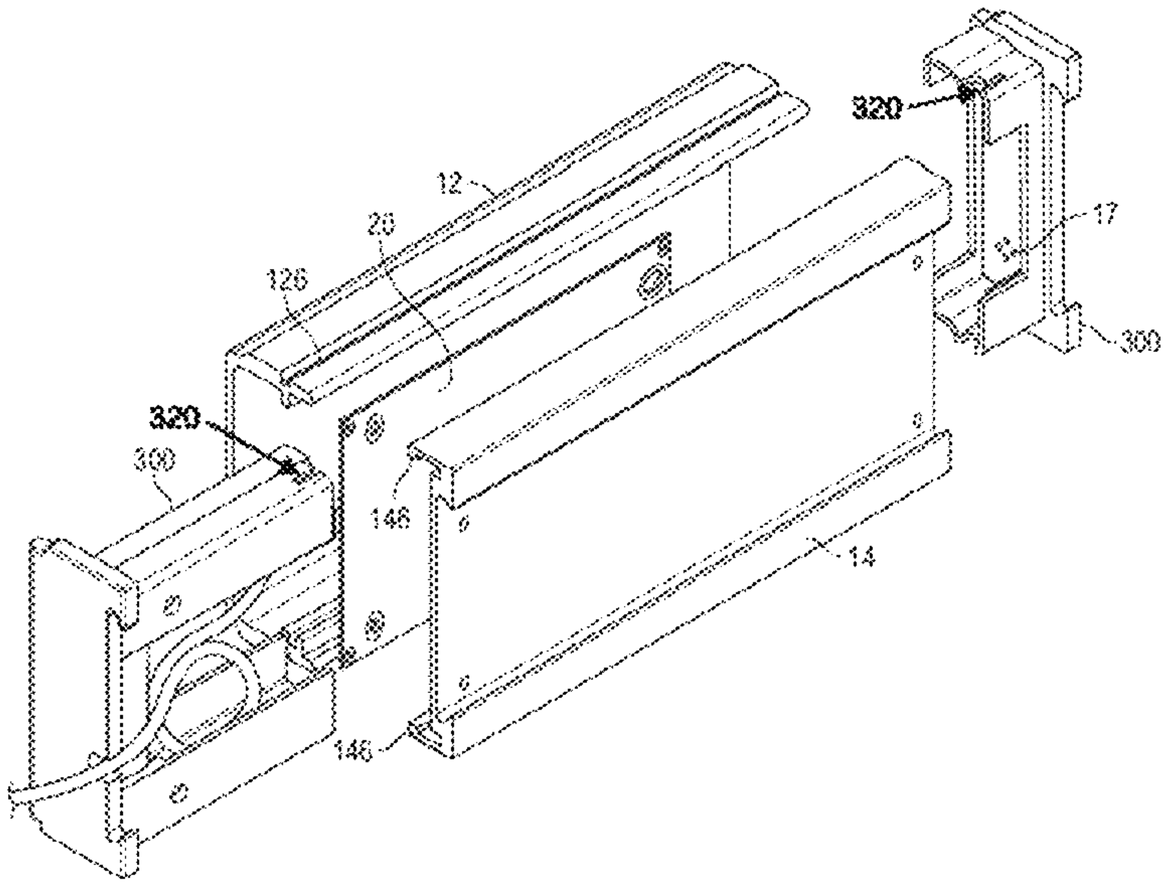
(57) **ABSTRACT**

A keyboard assembly is provided. The keyboard assembly includes an enclosure for protecting the keyboard and other components associated therewith. The enclosure is configured to engage with one or more bracket or bracket assembly, thereby providing a mounting system for supporting the enclosure. By engaging the enclosure with the bracket, the position of the keyboard can be controlled and maintained. By disengaging the enclosure from the bracket, the bracket can be moved and/or the enclosure can be engaged with a different bracket, thereby satisfying different requirements and/or preferences associated with the location of the keyboard.

20 Claims, 18 Drawing Sheets



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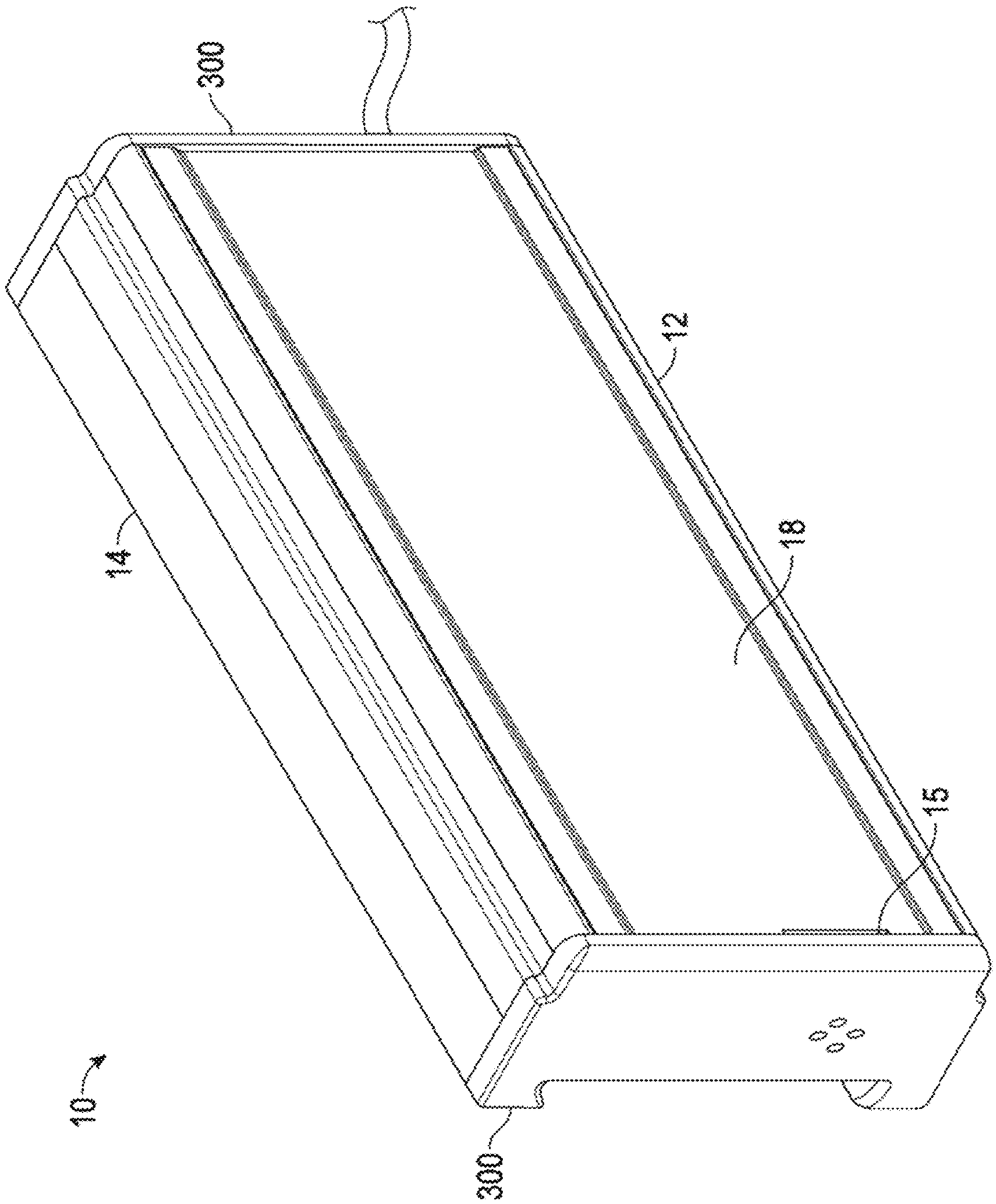

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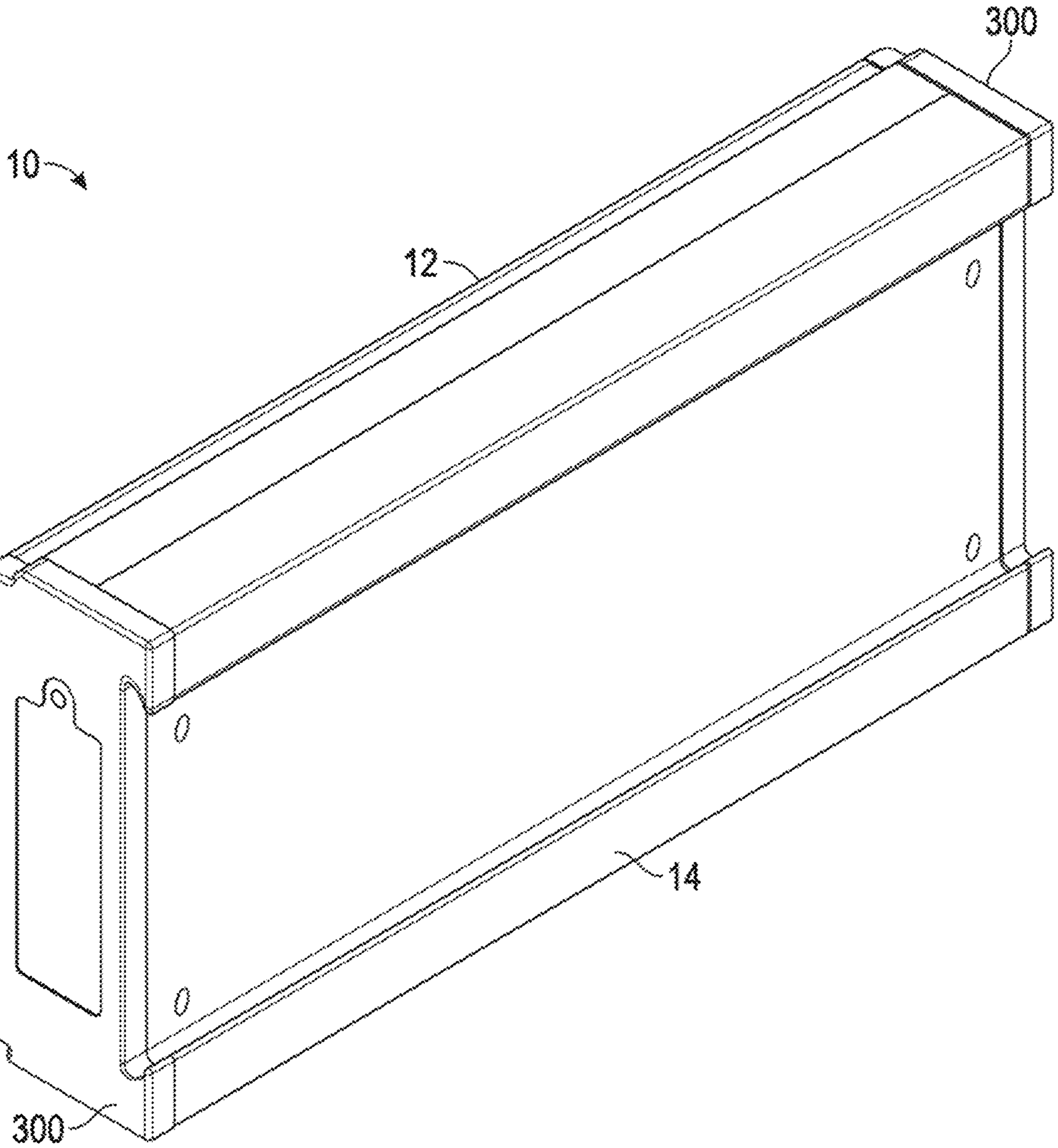

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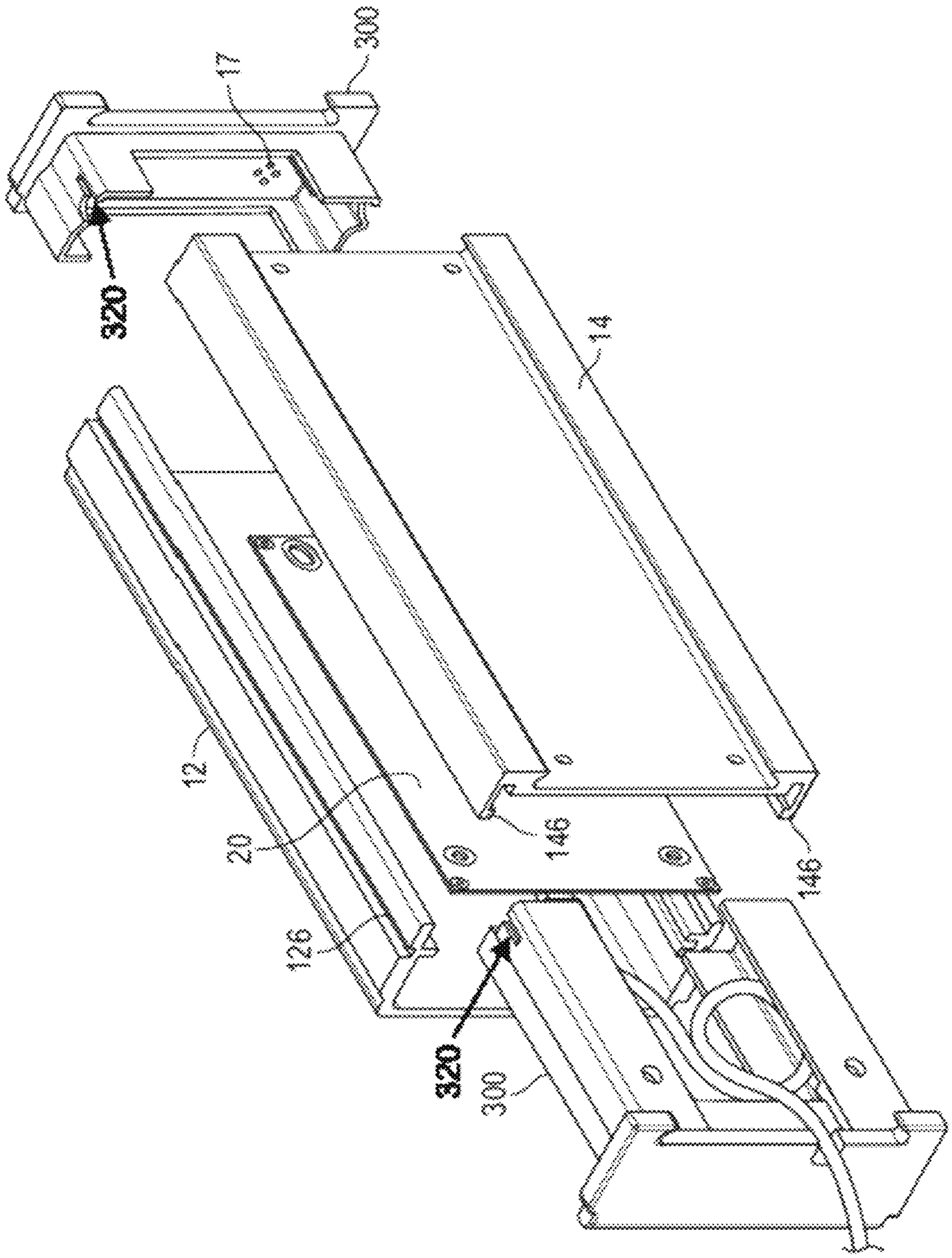

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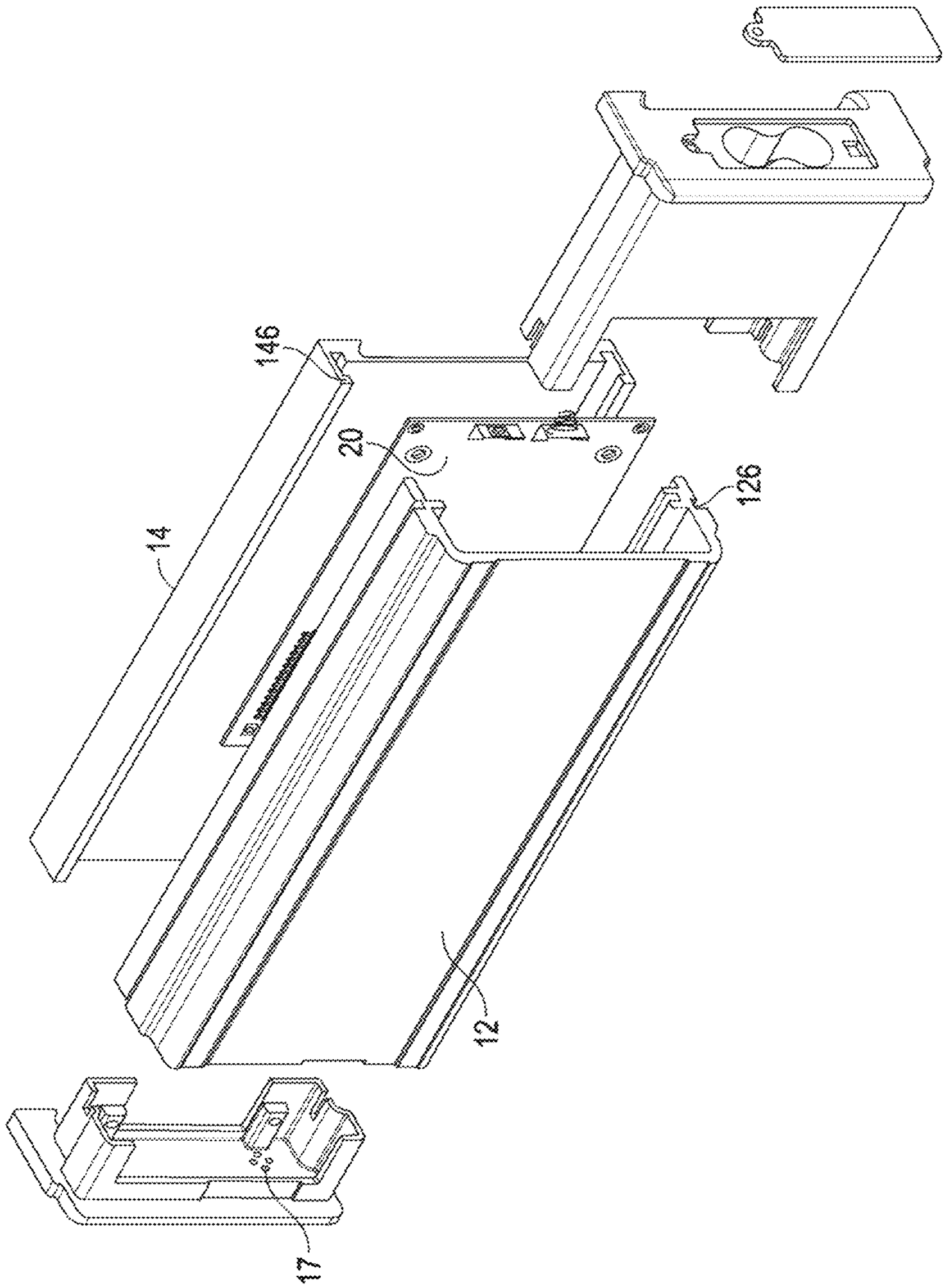

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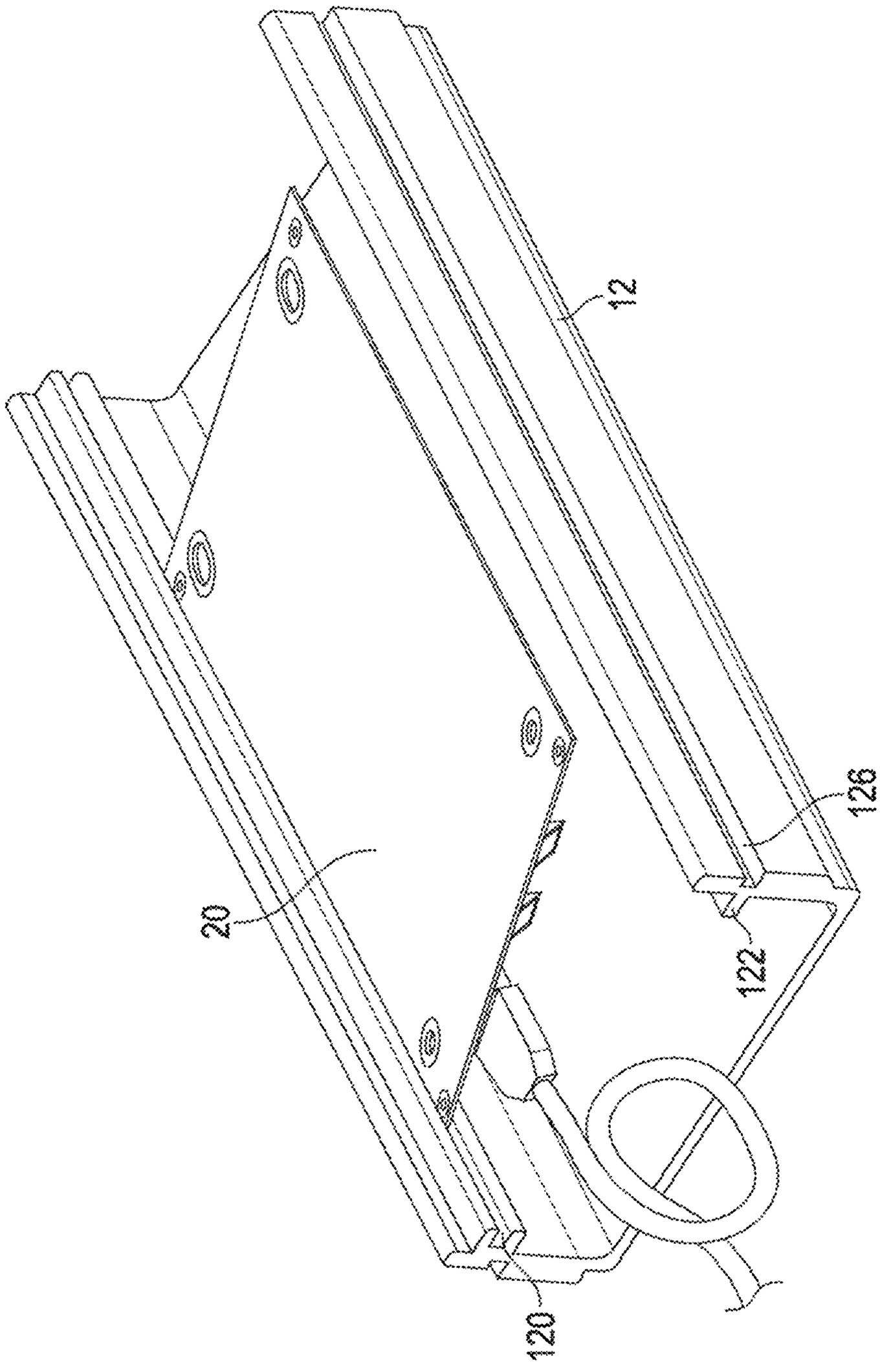

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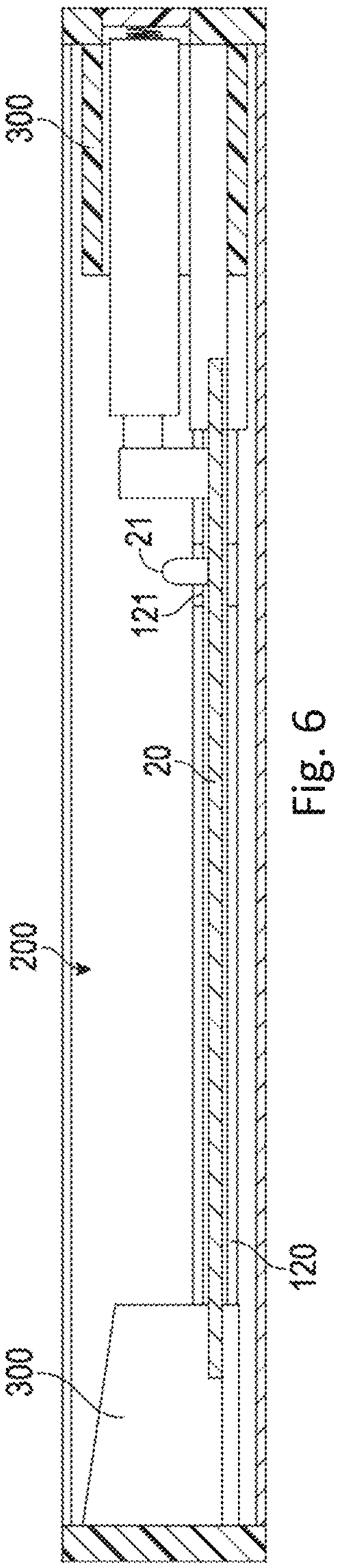

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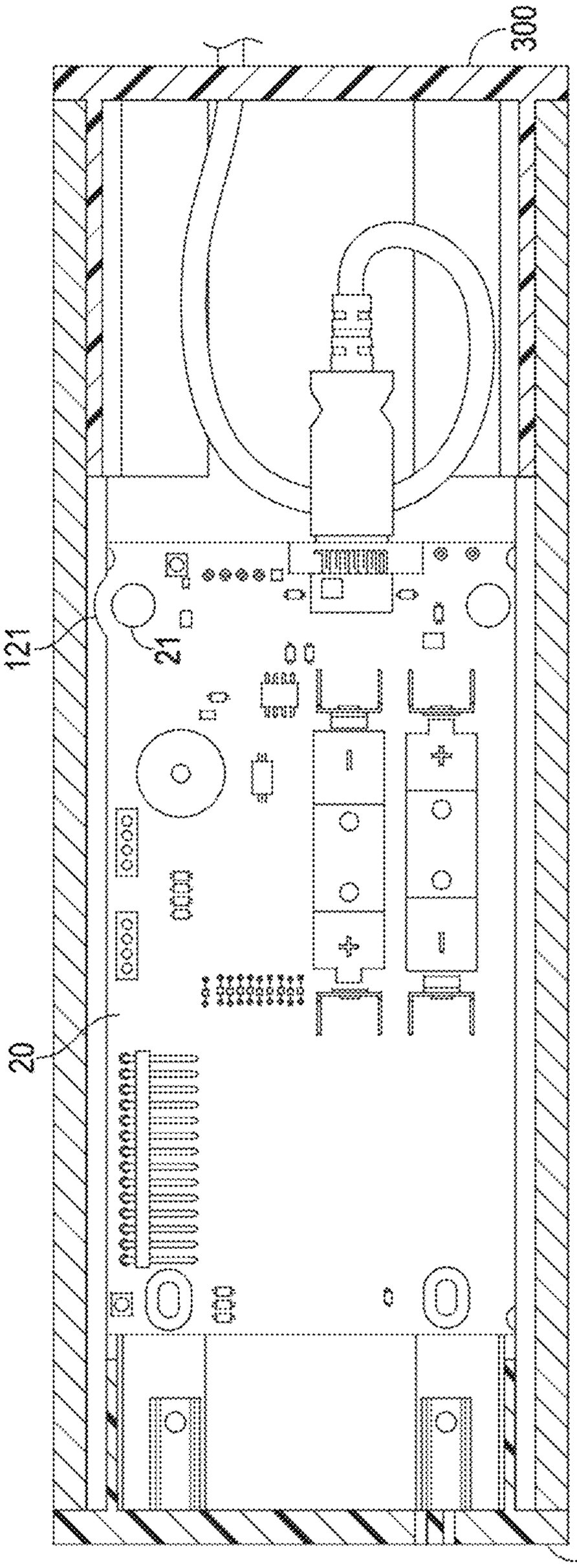

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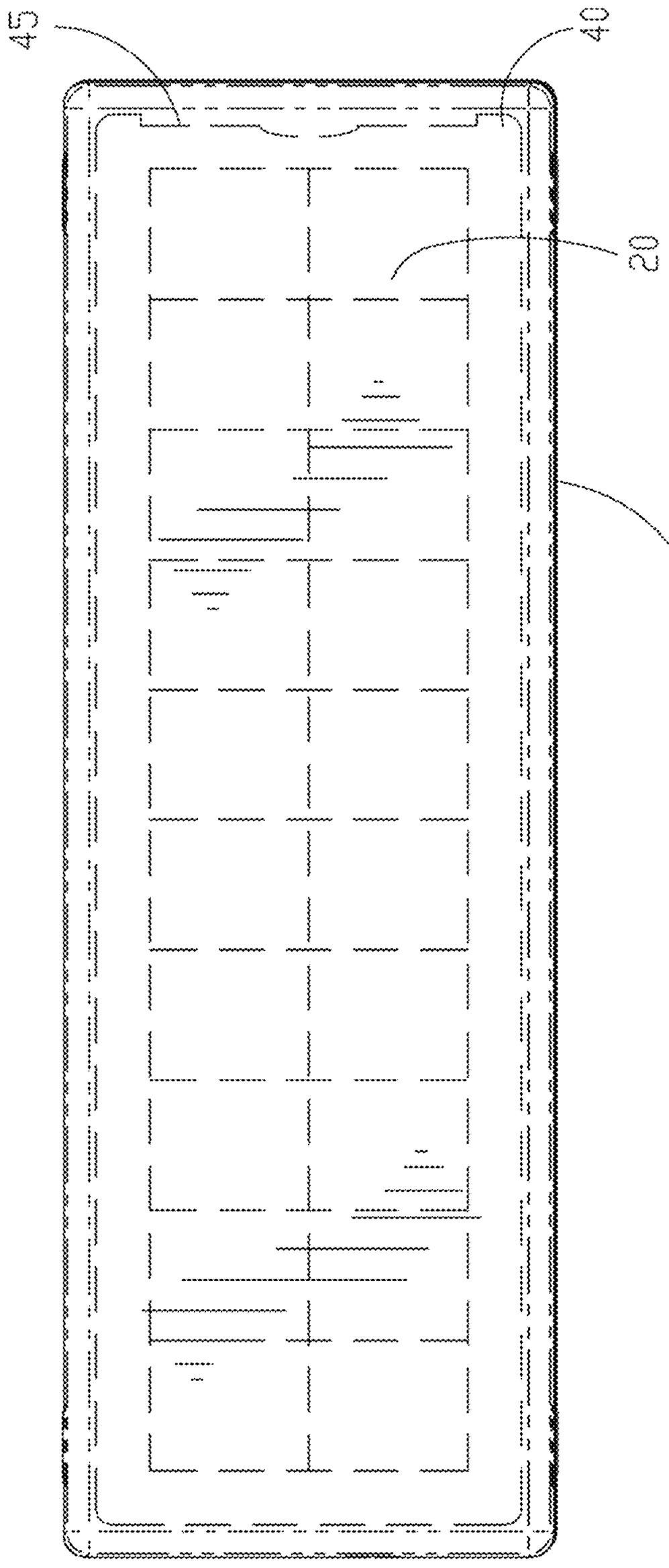

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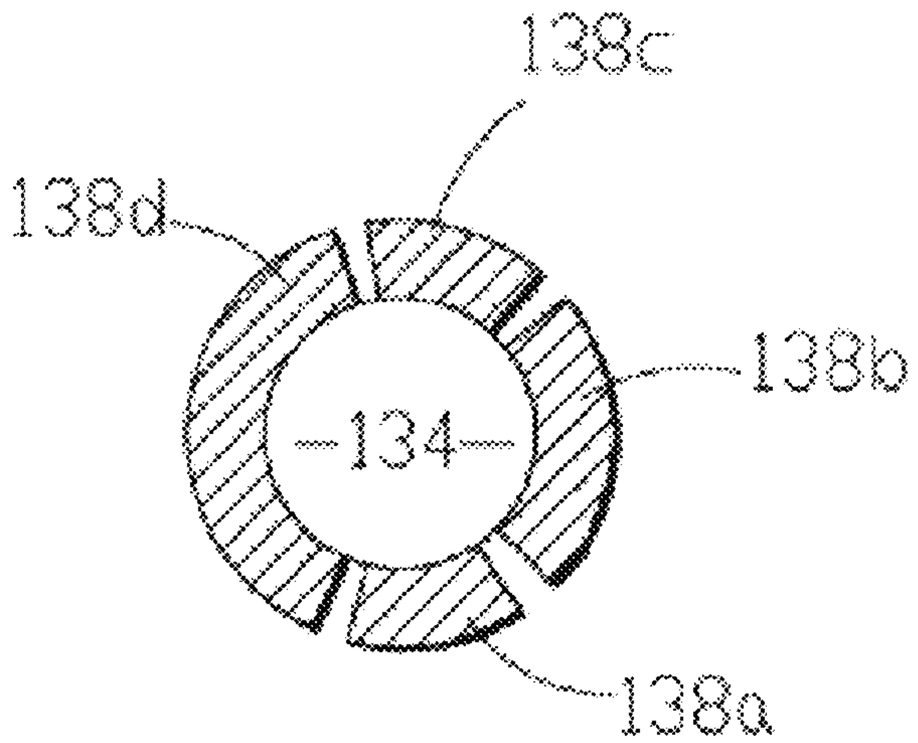

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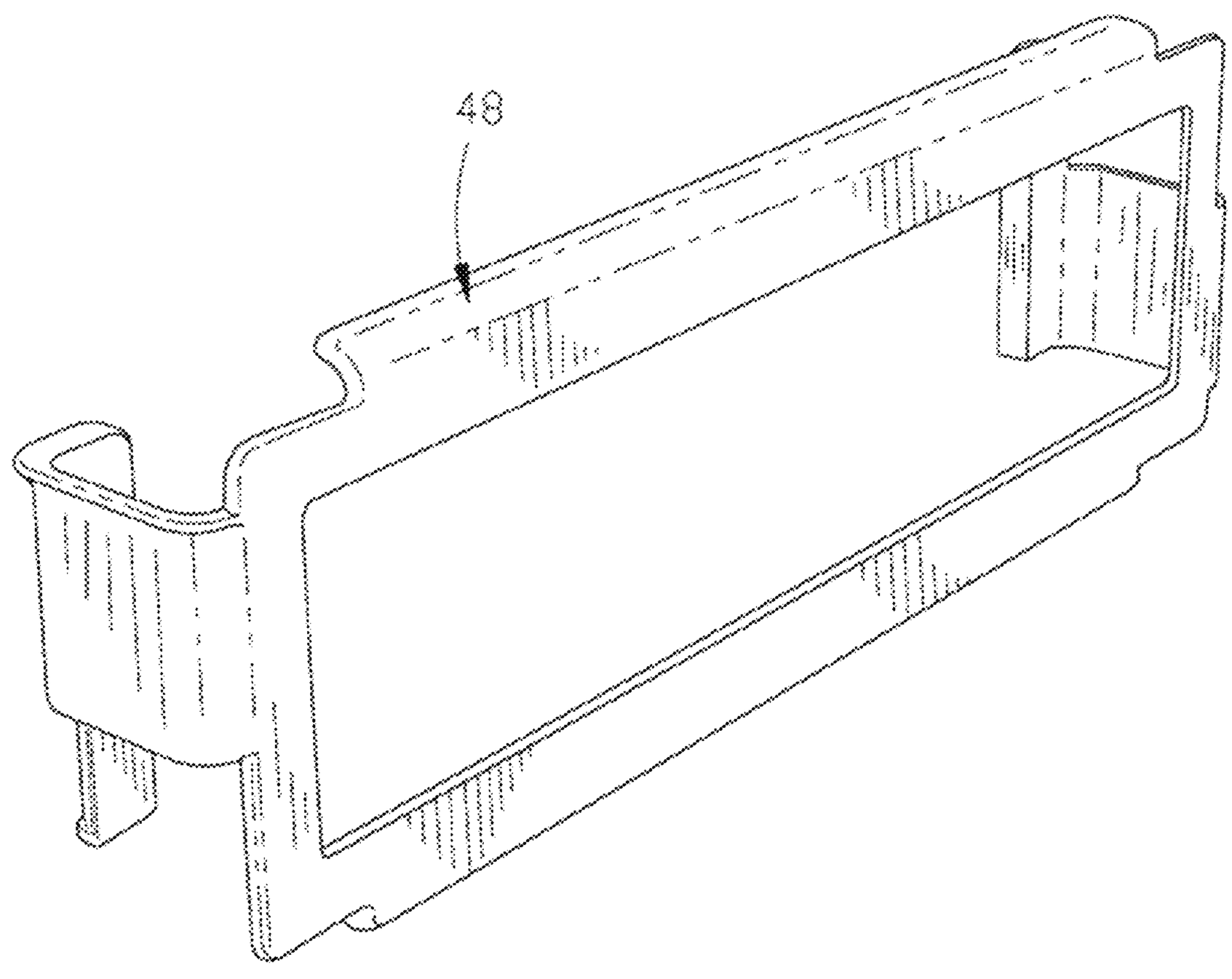
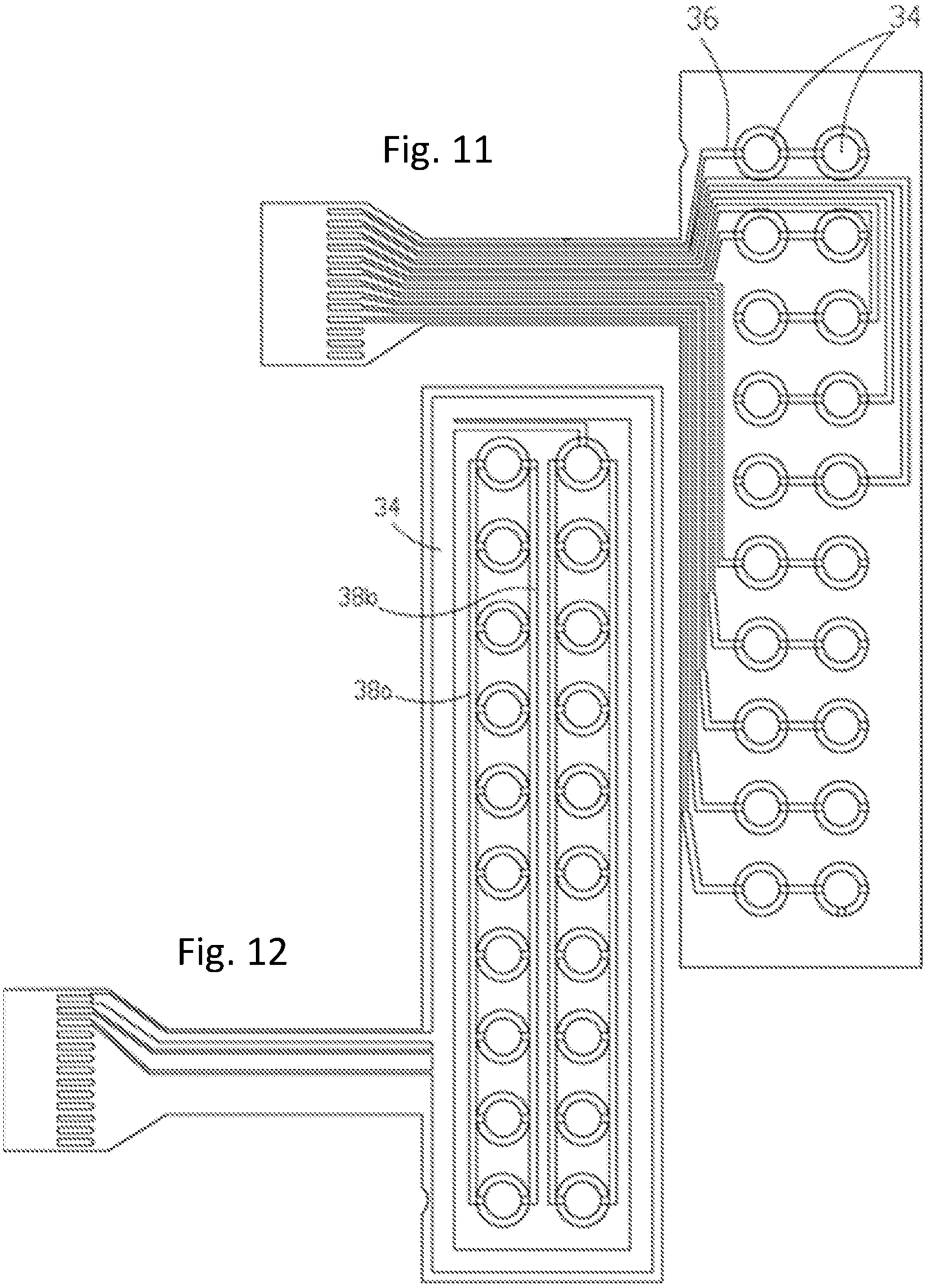


Fig. 10

Fig. 11



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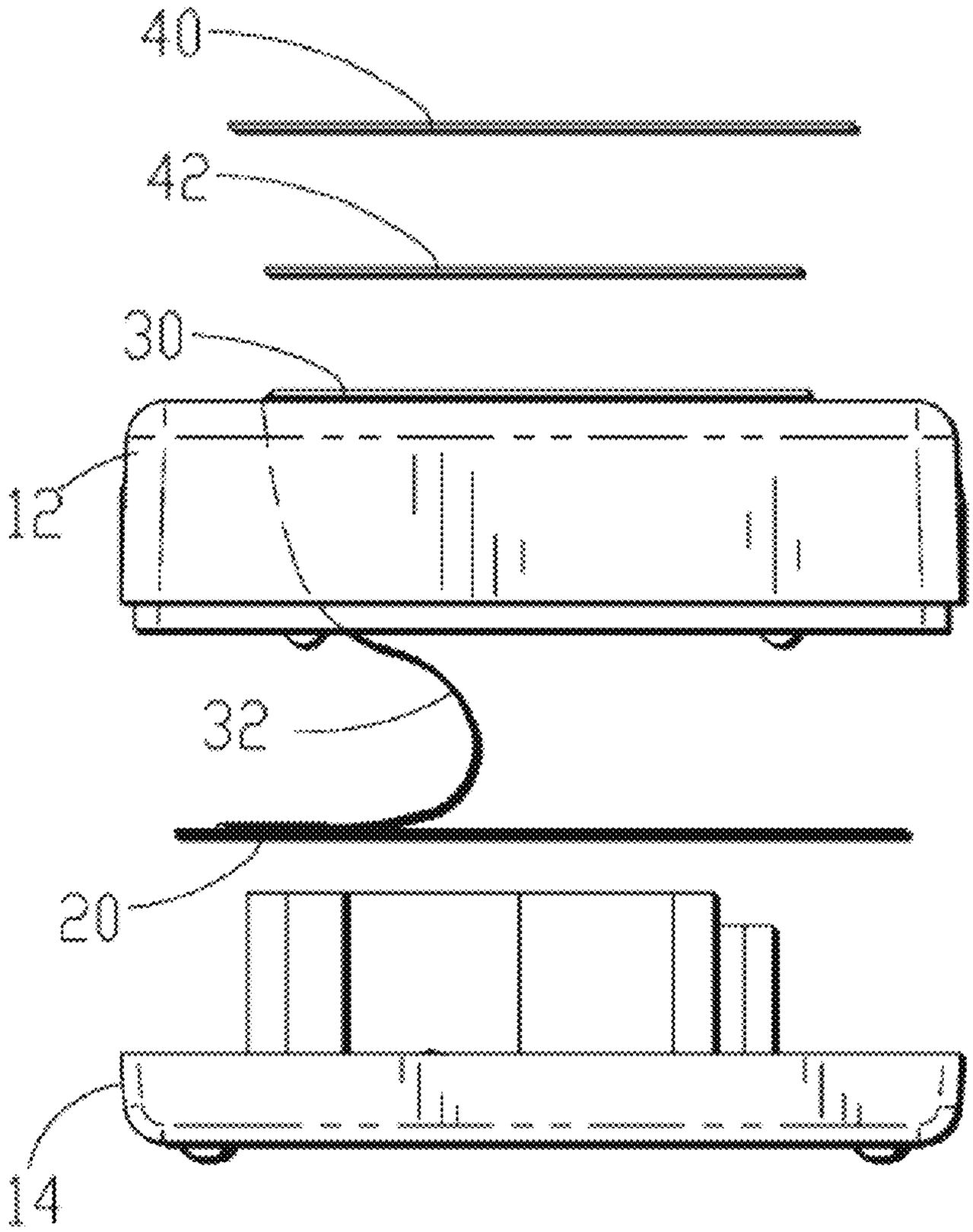

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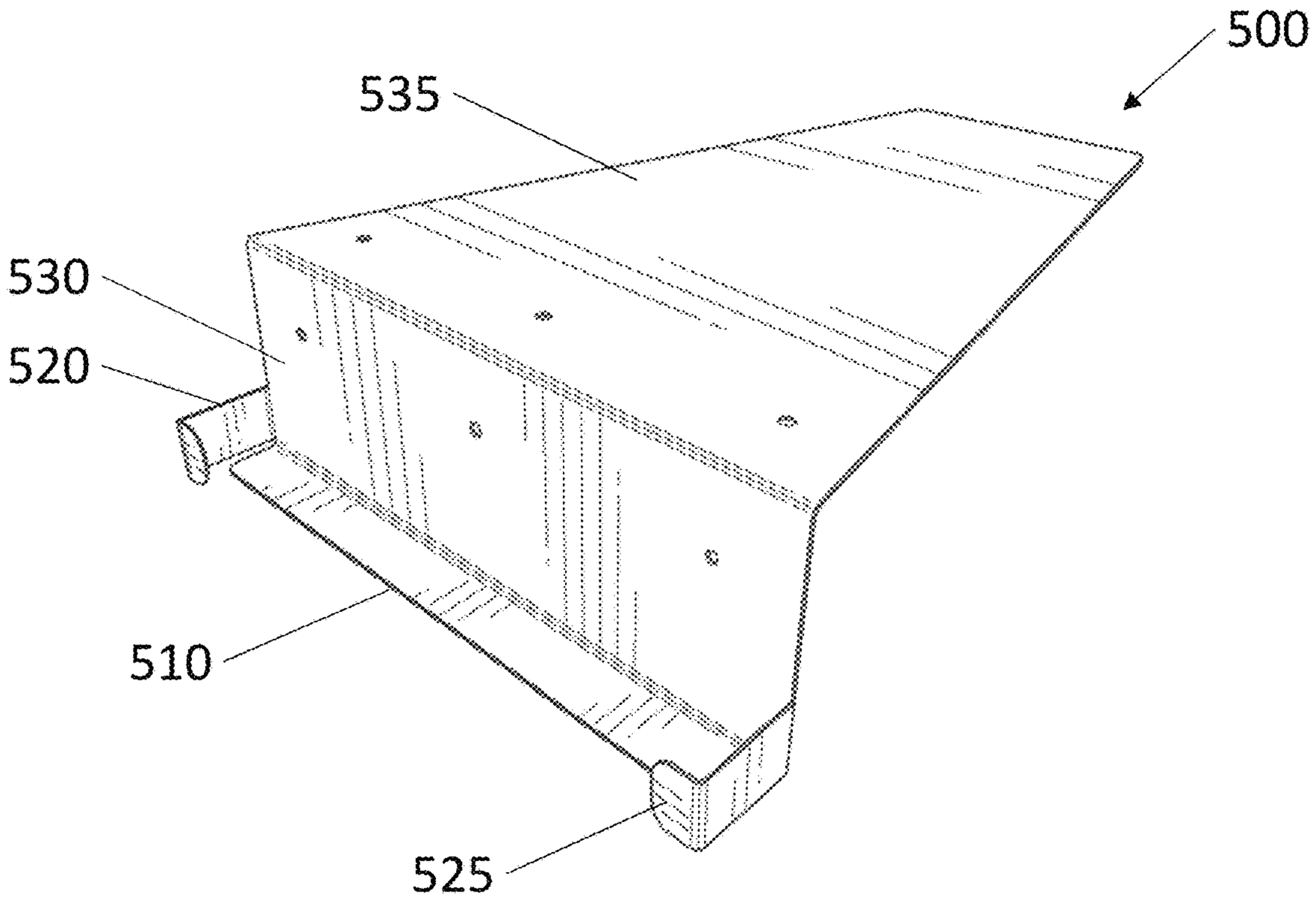

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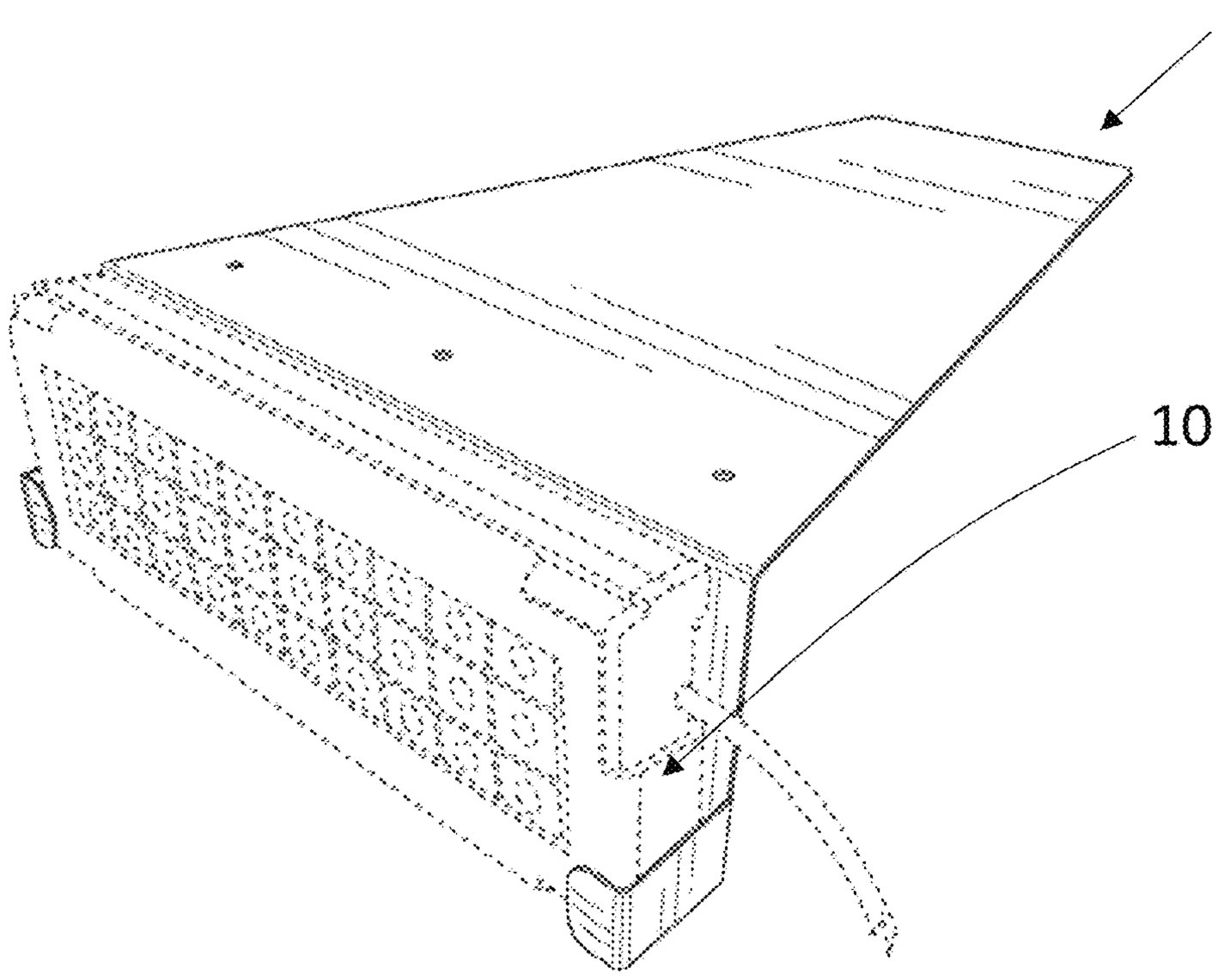

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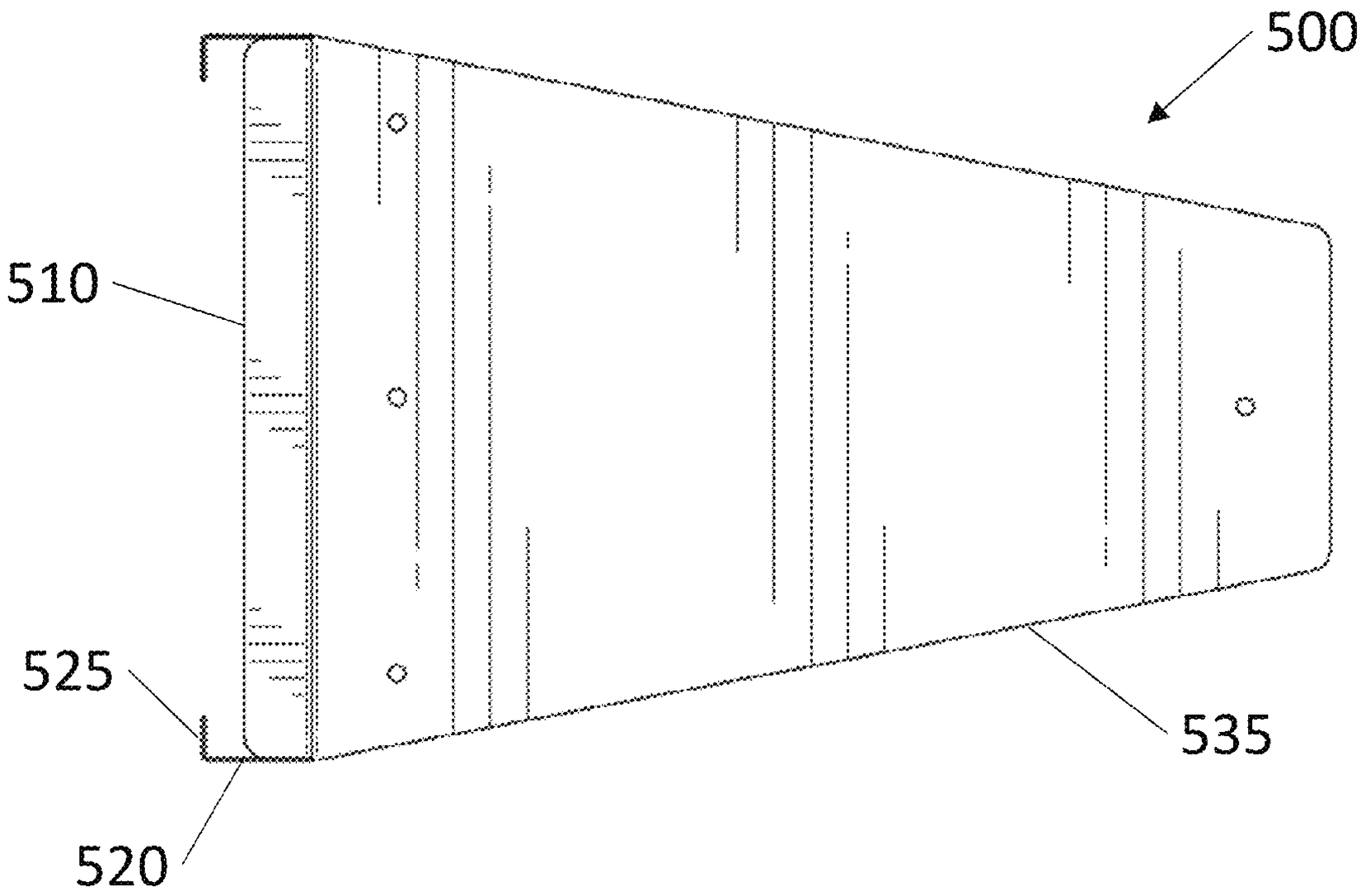


Fig. 16

Fig. 17

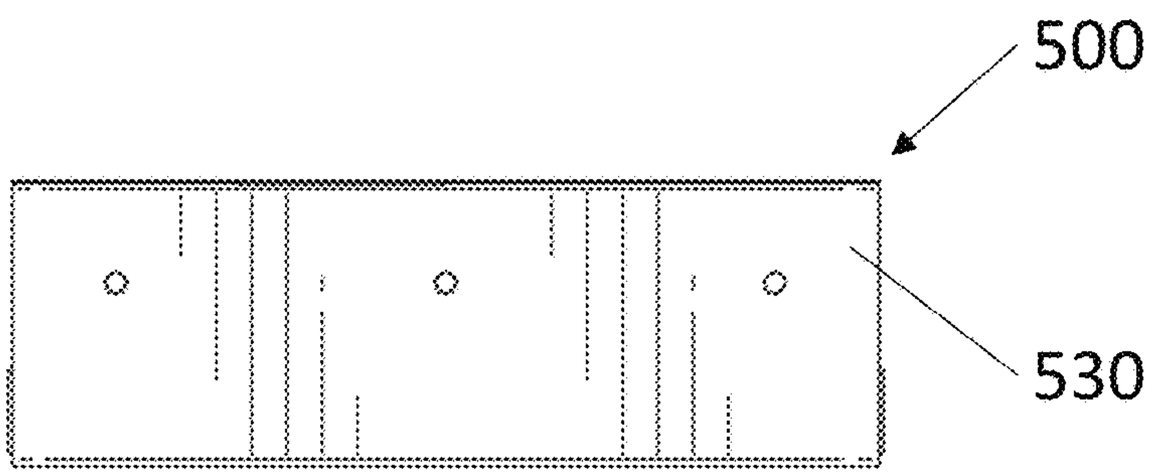
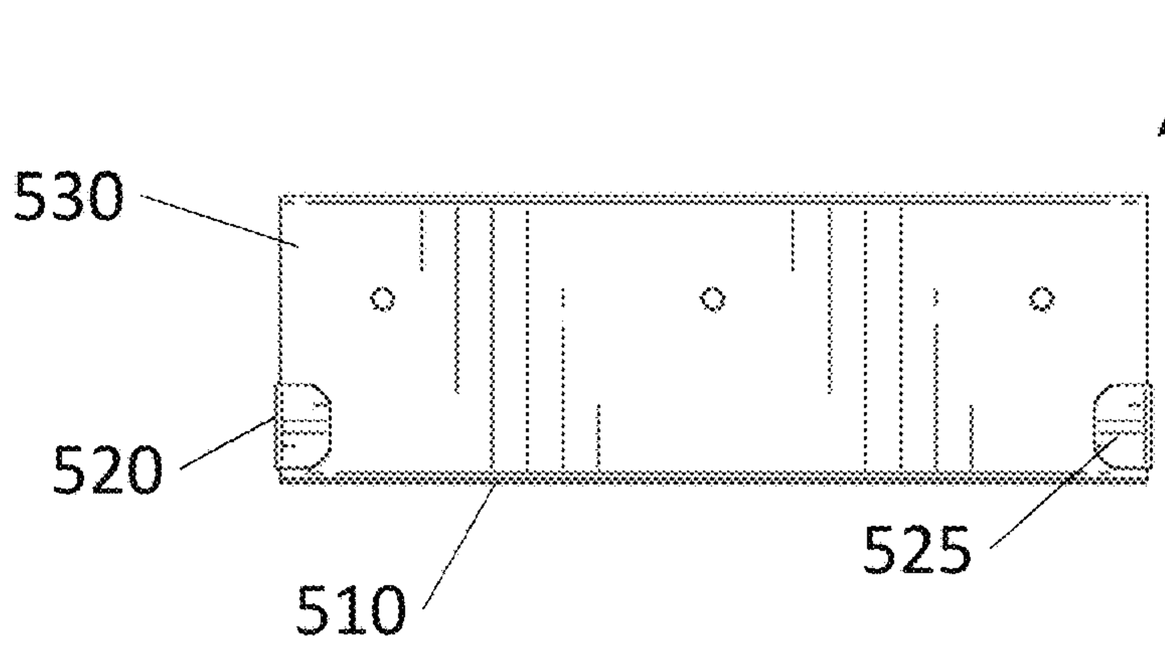


Fig. 18A



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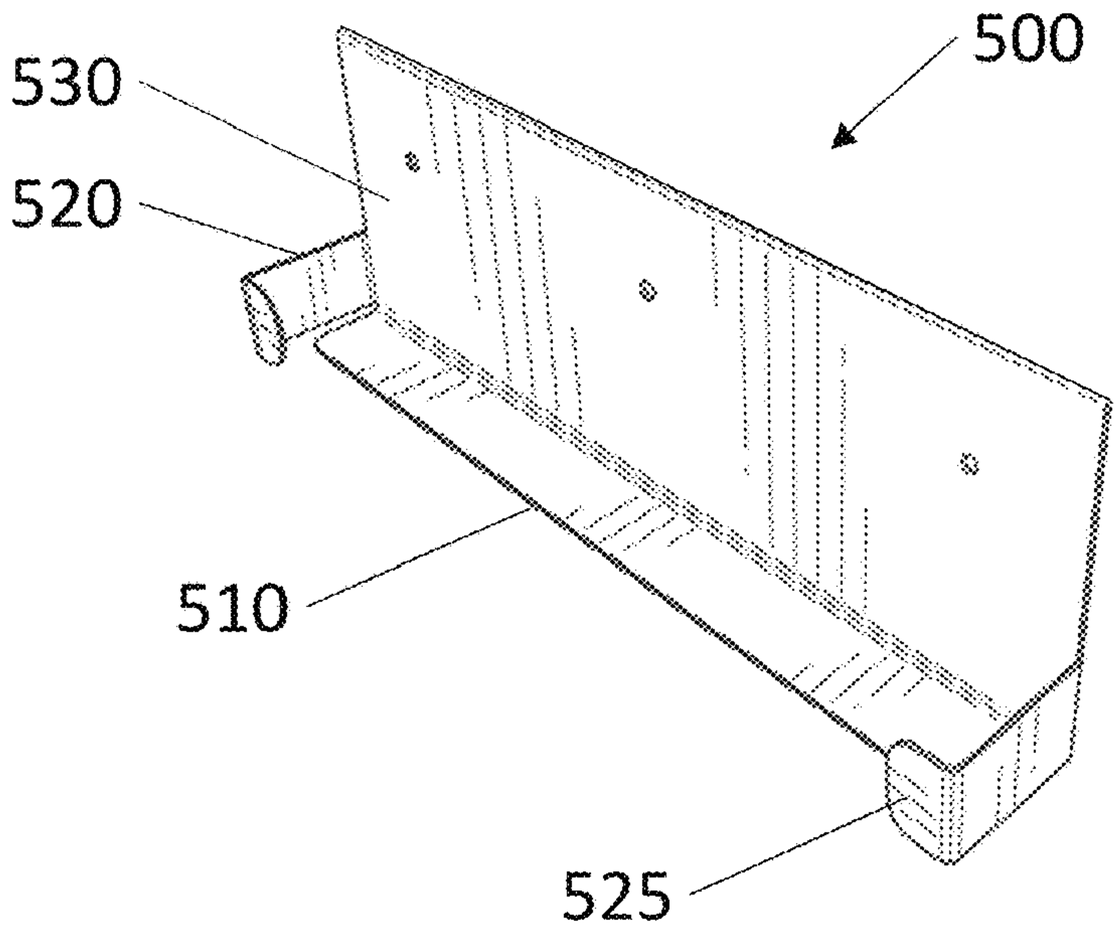

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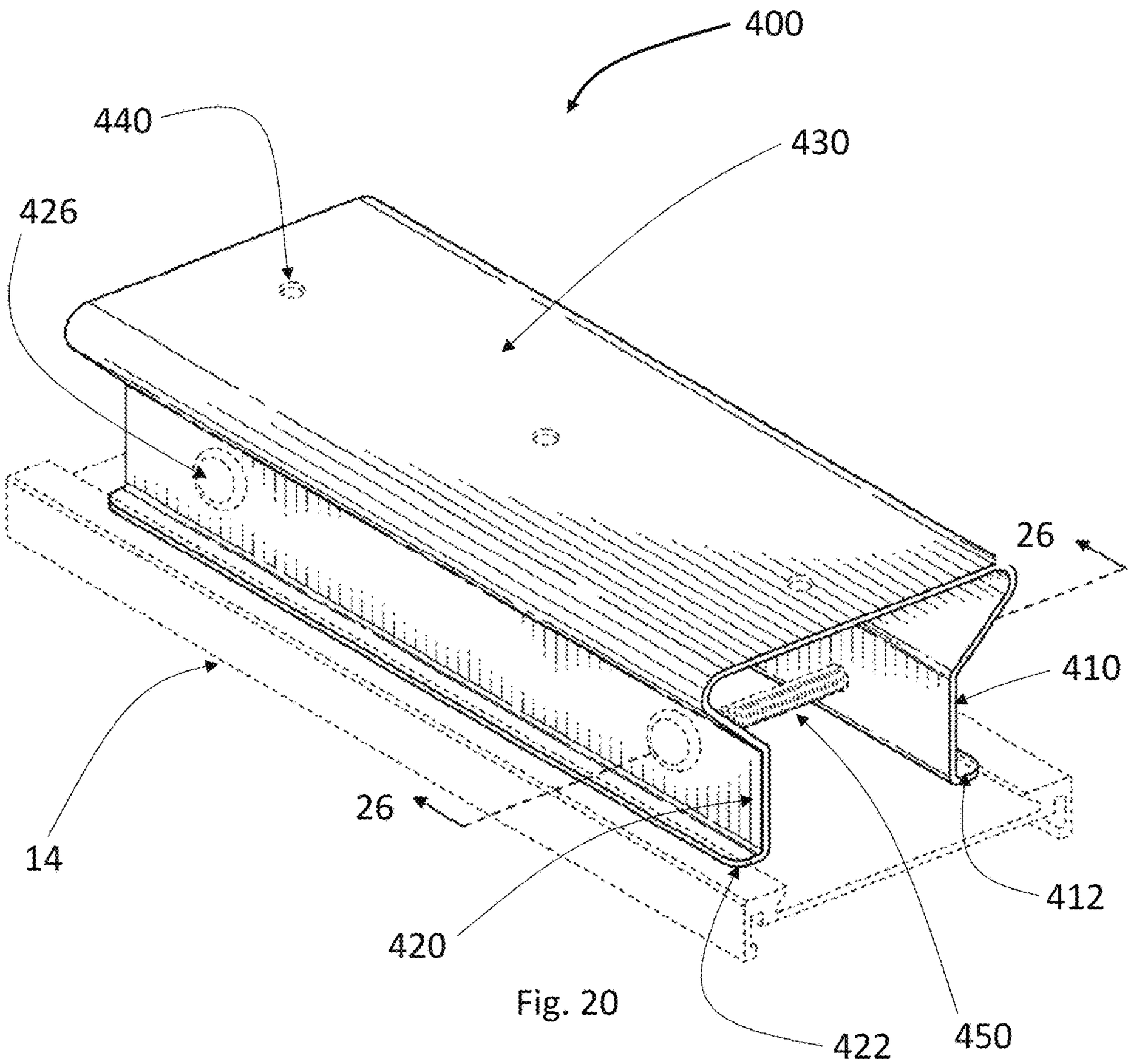

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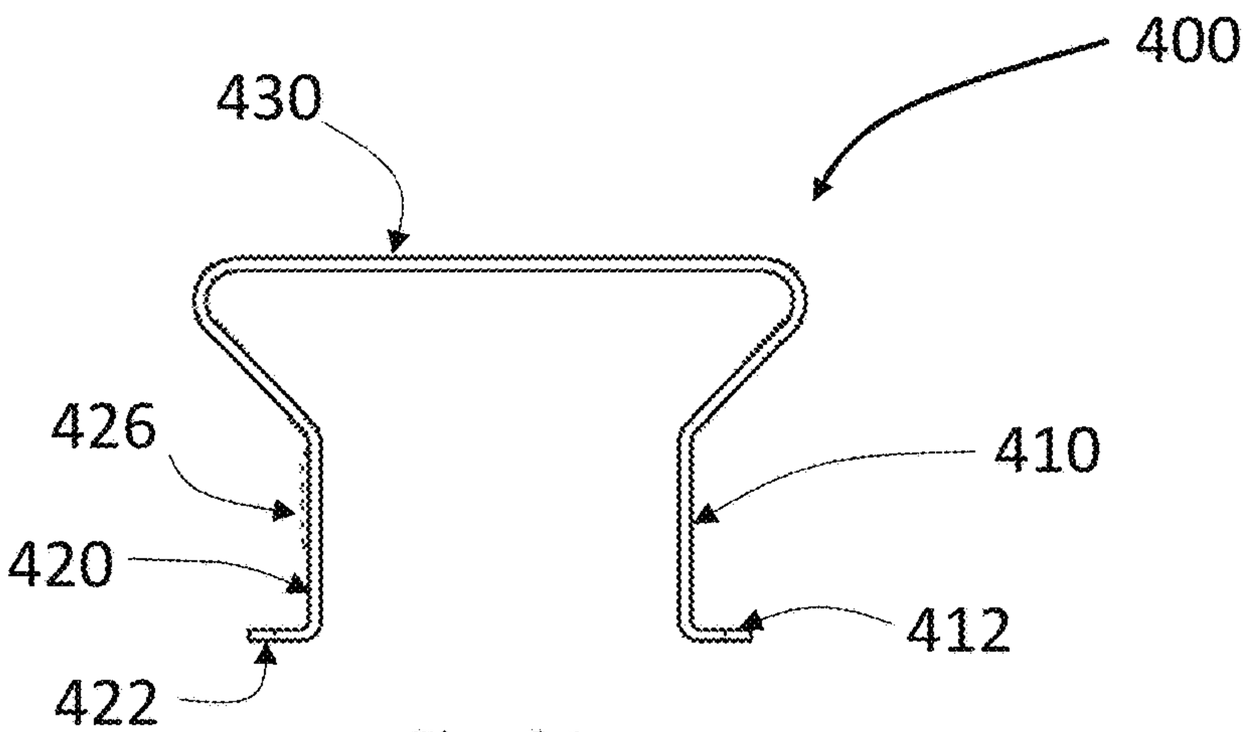

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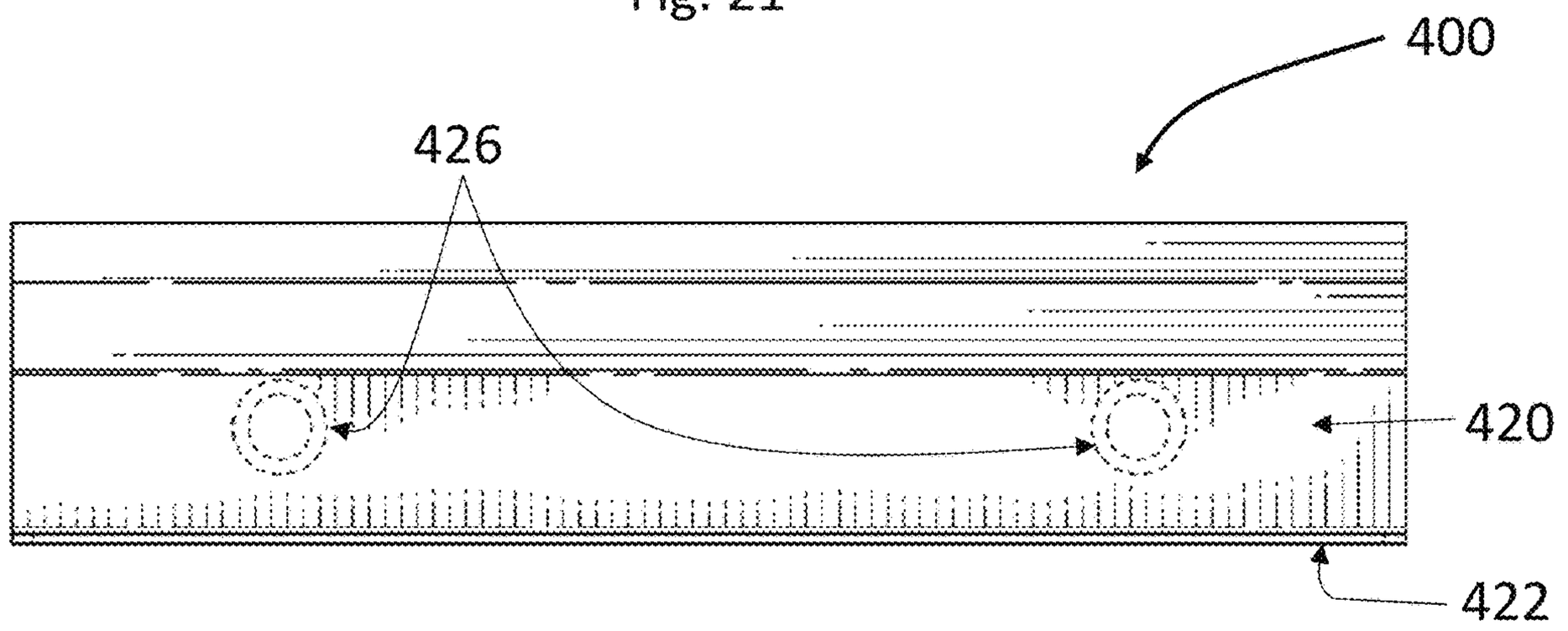

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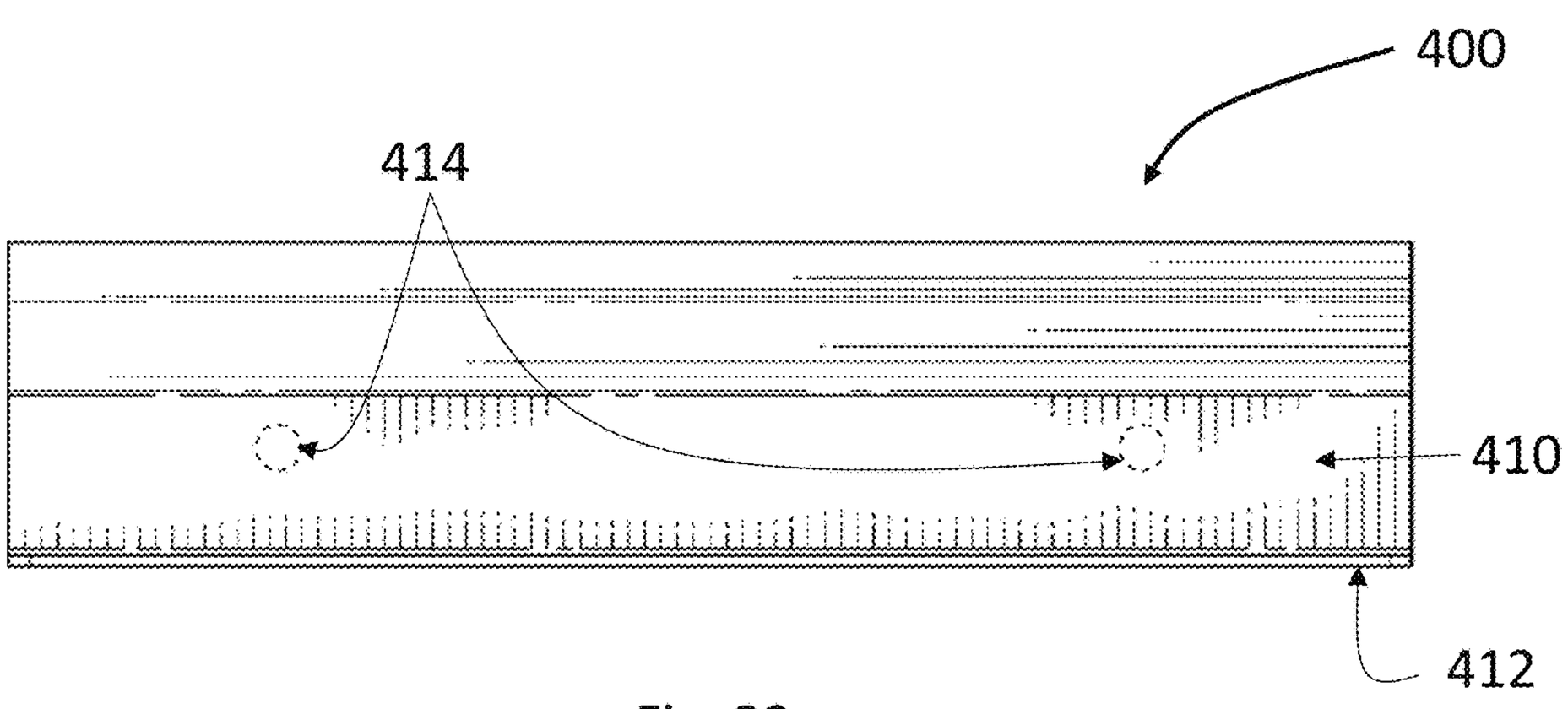

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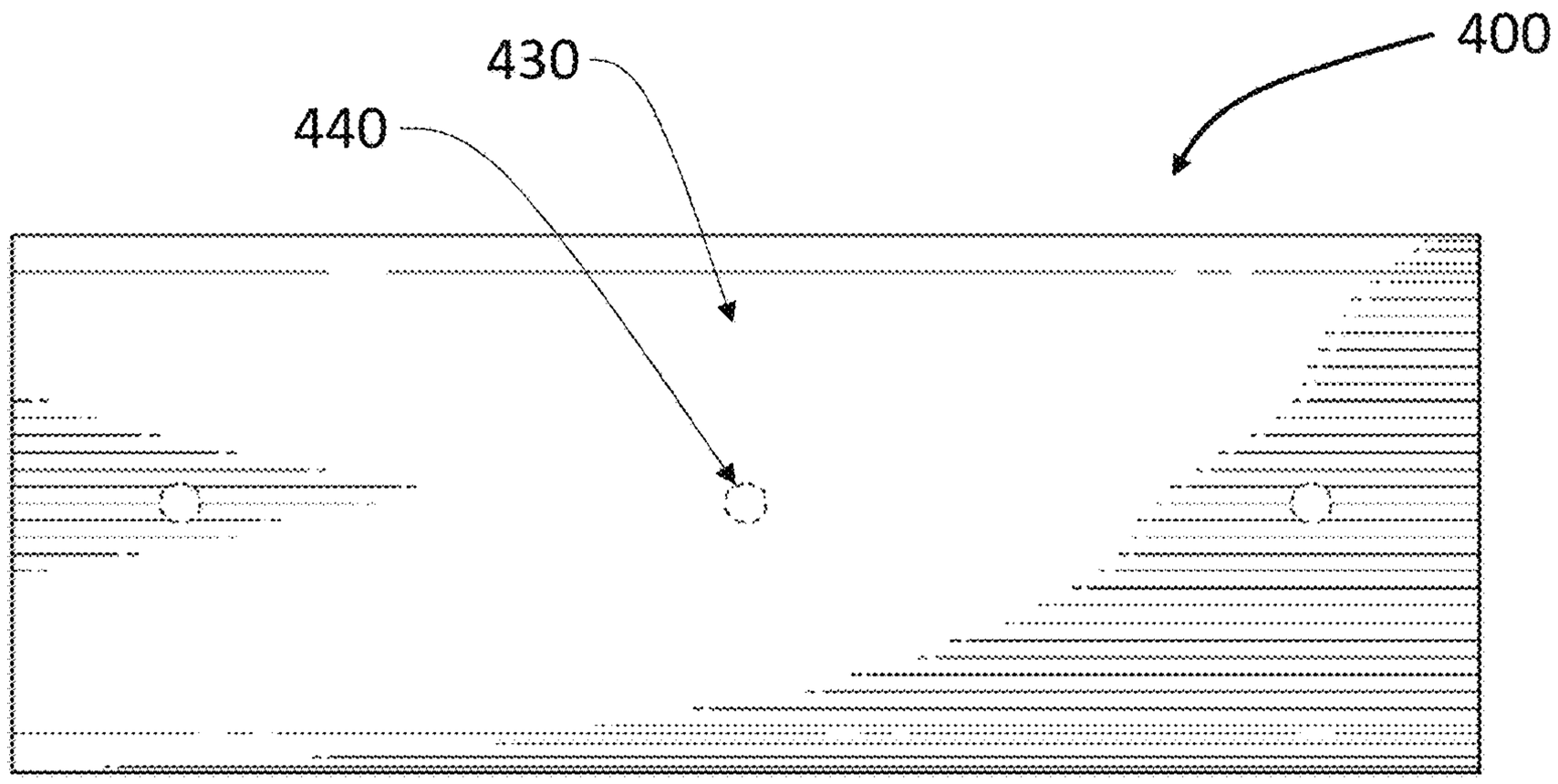

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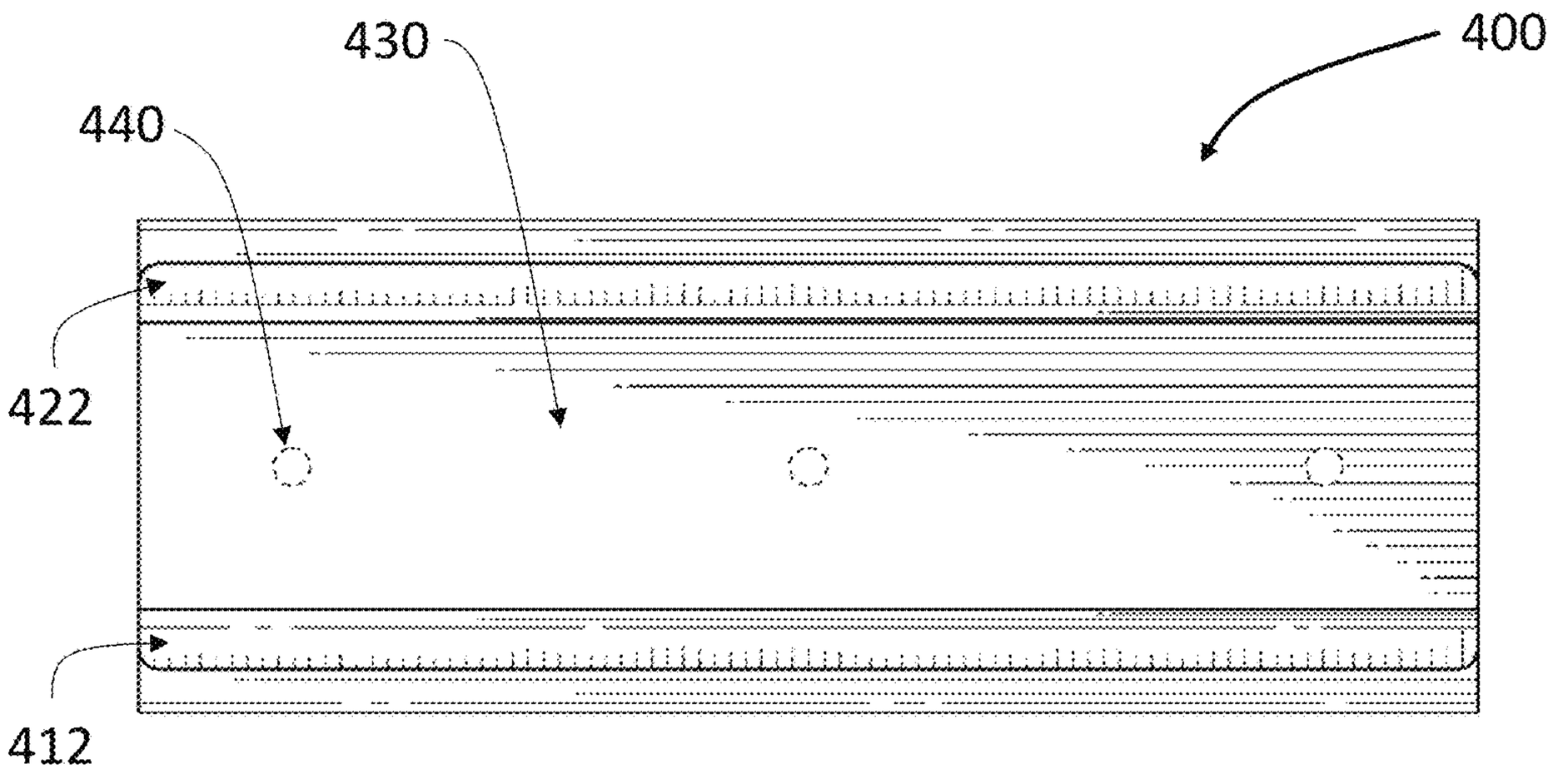

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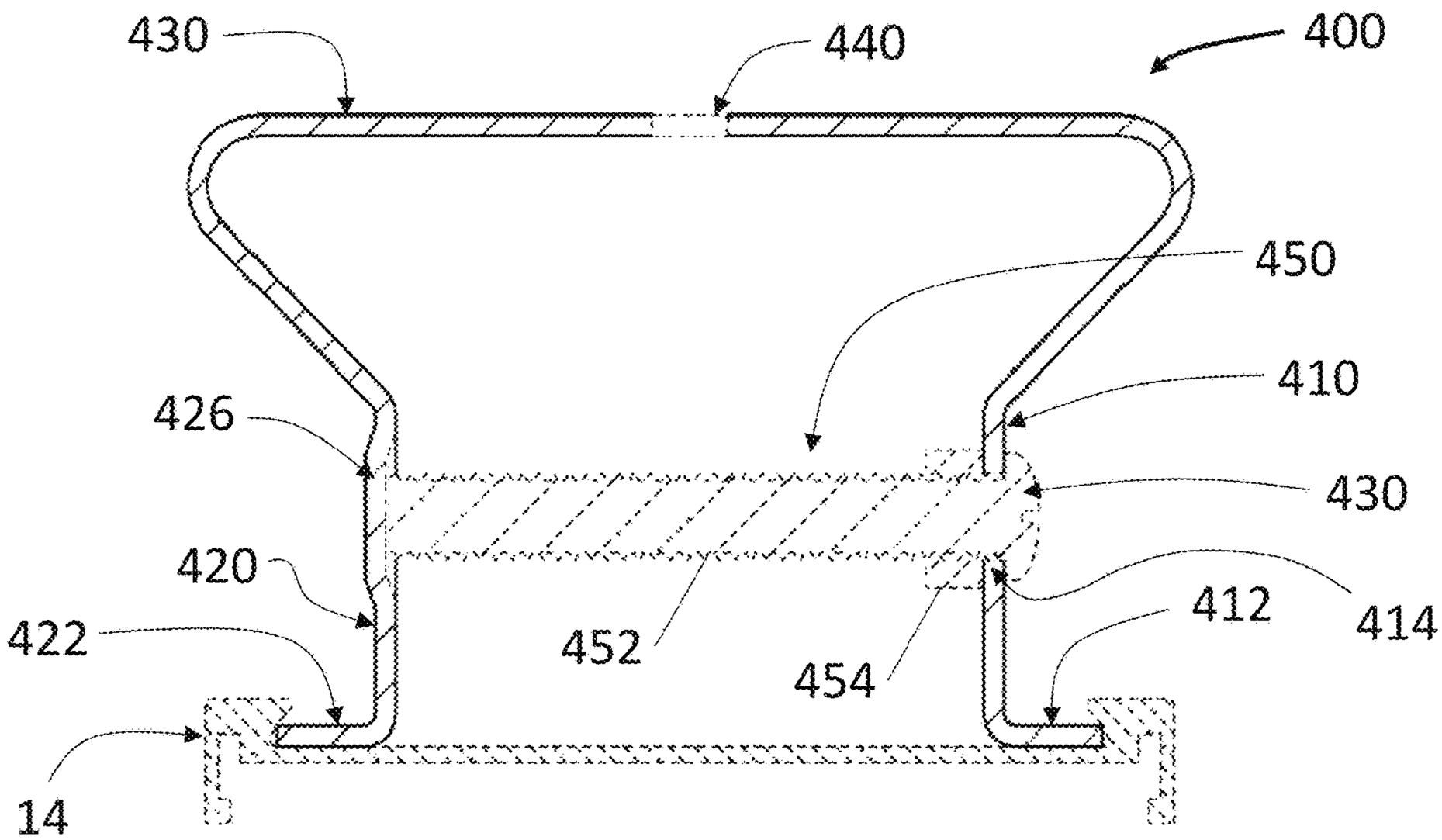
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Fig. 26

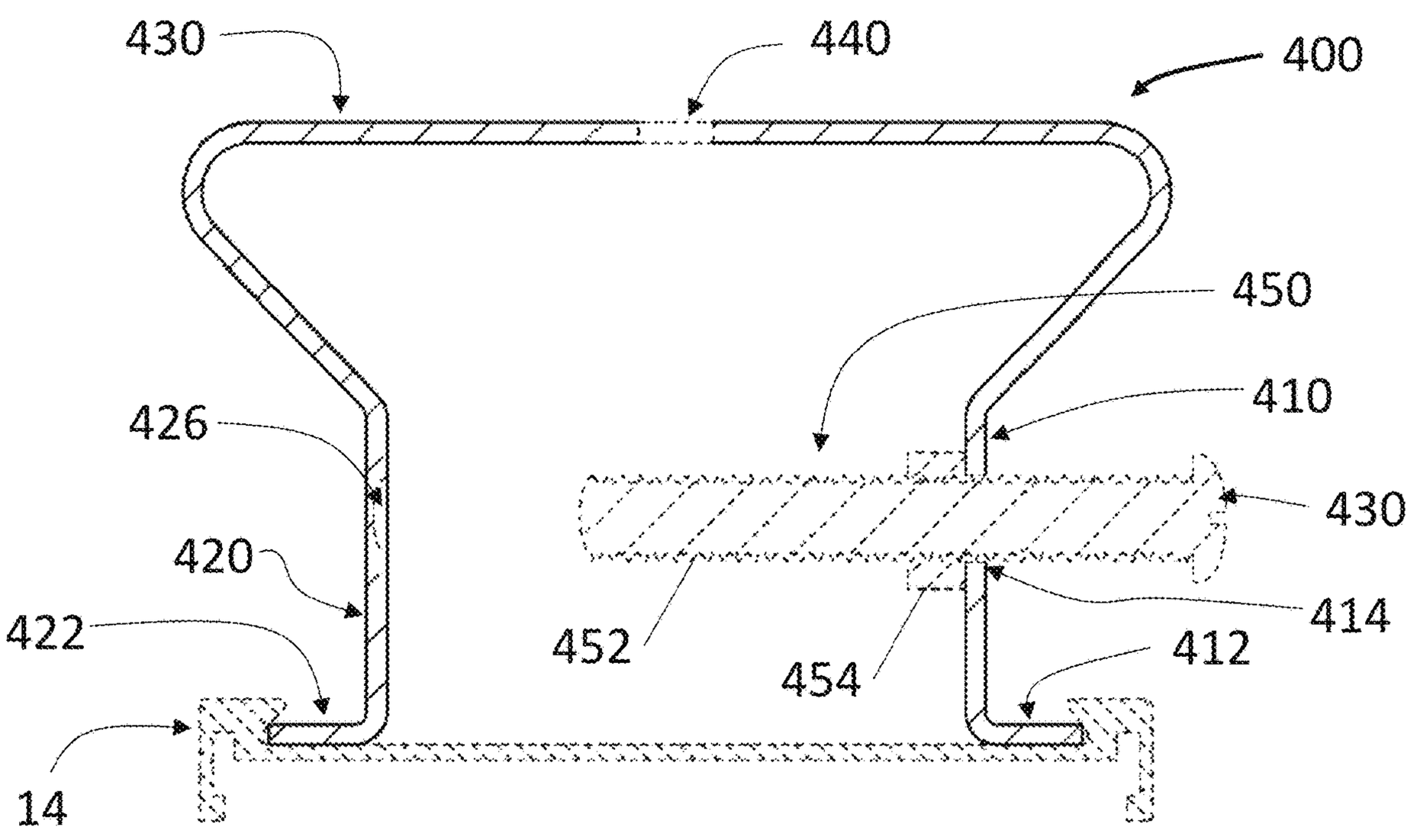
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Fig. 27

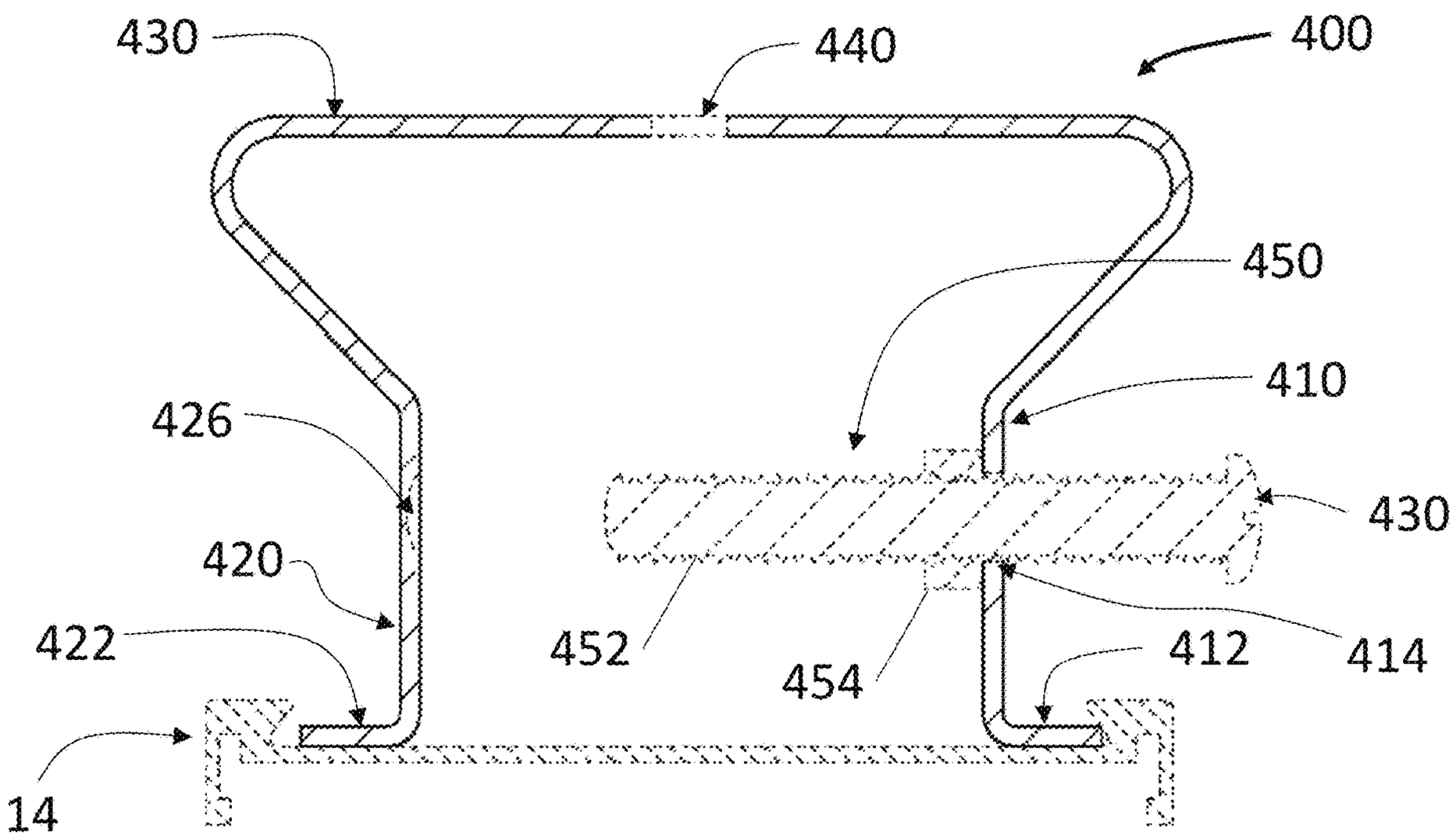

Fig. 28

KEYBOARD ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part application of:

U.S. patent application Ser. No. 16/505,476, filed Jul. 8, 2019, for KEYBOARD/KEYBOARD ENCLOSURE, which claims priority to U.S. patent application Ser. No. 15/599,400, now U.S. Pat. No. 10,345,920, filed May 18, 2017, which claims priority to U.S. Provisional Patent Application Ser. No. 62/508,048, filed May 18, 2017, and U.S. Provisional Patent Application Ser. No. 62/338,428, filed May 18, 2016;

U.S. Design patent application Ser. No. 29/614,843, filed Aug. 23, 2017, for BUMP BAR/KEYPAD SHELF BRACKET; and

U.S. Design patent application Ser. No. 29/629,850, filed Dec. 15, 2017, for EXPANDABLE BRACKET, now U.S. Design Pat. No. D874,250,

the entire disclosures of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates generally to computer user interfaces. More specifically, the present invention relates to a keyboard/keyboard assembly that is particularly well-suited for use in quick serve restaurant environments.

BACKGROUND

Quick serve restaurants utilize many computers for purposes such as inputting orders at a counter and/or completing food orders in a kitchen. Many of the computers include a PS/2, serial, USB or other similar style input interface. The input interface (keyboard) typically includes a small number of keys (compared to a QWERTY keyboard) that includes letters, numbers, symbols or words associated with certain functions of the computer (i.e. inputting a customer's order, inputting completion of the order by a kitchen staff person, etc.). As commercial kitchen environments are typically extremely harsh due to high temperatures, corrosive substances (foods, liquids, etc.), employee usage/abuse, etc., the computer input interface devices are subjected to significant wear and tear.

Many of the input interface devices of the prior art typically includes a two-piece metal enclosure shell (front shell half and rear shell half) for a printed circuit board (PCB). The printed circuit board includes connectors for a PS/2 cable that connects to a computer, and for a ribbon cable that connects to a keypad membrane that is mounted to the outer surface of the enclosure. The PS/2 cable extends through a slot in the enclosure and is connected to the computer. Installing (or reinstalling/replacing) the PS/2 cable includes disassembling the two halves of the enclosure shell and inserting the cable into the slot in the side of one of the halves of the shell. Due to the design of such prior art metal enclosures, this is a time consuming process, and can result in damage to the PCB. To overcome disadvantages with the prior art metal enclosures, the instant inventor developed the enclosure of U.S. Pat. No. 9,016,965 (the "'965 Patent"), the entire disclosure of which is incorporated herein by reference. The enclosure of embodiments of the '965 Patent includes a front shell portion and a rear shell portion, each made of nylon 6. While the enclosure of the '965 Patent provides many advantages to the metal enclosures of the prior art, many restaurants still prefer a metal enclosure, due to a perception that metal is more durable than nylon.

Therefore, it is desirable to provide a keyboard assembly having a metal enclosure that is easy to assemble/disassemble.

Additionally, many restaurants commonly keep keyboard and similar input devices (each a "keyboard") close to the working surfaces of respective workstations. Many times, the keyboards have but a few optimal locations (and maybe only a single optimal location) relative to a respective workstation. If such keyboards cannot be located in such optimal location(s), they must be located in sub-optimal locations—such as locations where customers can view the keyboard (oftentimes not a part of the overall store dress) or in locations where they cannot accommodate certain workstation or work floor configurations. Furthermore, it is often required or desirable to move or relocate a keyboard, such as during a peak or non-peak times, when new product offerings are introduced (which can be relatively common in certain quick-serve restaurants), when reconfiguration of workstations is required or desired, and/or the like. Present keyboard assemblies are limited in their configurability and reconfigurability to address such situations.

Accordingly, there is a need for a mounting system, such as a bracket, that provides for versatility in mounting locations for keyboards. Furthermore, it would be beneficial to have a keyboard assembly that was easily configurable and reconfigurable to address changing requirements and recommendations.

SUMMARY

Improved Enclosure

The instant invention provides a keyboard assembly having an enclosure, such as a metal enclosure that is easy to assemble/disassemble. In some embodiments, the enclosure includes a front metal member and a back metal member that slide-fit together via an interlocking tongue and groove structure. In some embodiments, the metal front and back are made of aluminum. End caps are located on each end of the joined front and back members to complete the enclosure. In some embodiments, the end caps are made of a nylon or other non-metal material. In some embodiments, the end caps include a knock-out area to allow a ribbon cable for a keypad membrane that is positioned on the exterior surface of the metal front to be extended through the end cap into an interior of the enclosure, thereby facilitating digital communication with a PCB located within the enclosure. In some embodiments, the end cap includes receiver structure to support the PCB located within the enclosure.

In some embodiments of the inventive concept, the keypad can be programmed with "macros" that are stored on the PCB. In this manner, an app on a computer or other device is utilized to program the macros. The keypad is connected to the computer and instructions are uploaded to the keypad to store a series of characters that are stored in connection with each key. In this manner, once the keypad is programmed and connected to a computer for use, when a user presses a key the series of characters stored on the PCB will be sent from the keypad to the computer to which it is connected.

Mounting System—Shelf Bracket

In some embodiments, the keyboard assembly includes a shelf bracket for supporting one or more enclosure of the

present invention and/or the prior art. In some embodiments, the bracket includes a first shelf member for providing vertical support and a mounting element for securing the shelf bracket to a support structure. In some embodiments, the shelf bracket includes a plurality of flanges for preventing or otherwise inhibiting lateral movement of the enclosure relative to the shelf member.

Mounting System—Expandable Bracket

In some embodiments, the keyboard assembly includes an expandable bracket that is configured to selectively engage with an enclosure, such as the enclosures of U.S. Pat. No. 10,345,920.

The Expandable Bracket of the present invention is configured to secure a keyboard enclosure in position relative to a wall or other structure, thereby providing a support structure for the keyboard enclosure. In some embodiments, a mounting element defines a plurality of apertures for securing the Expandable Bracket to the wall or other structure with a screw or other fastening means. It will be appreciated that in other embodiments the expandable bracket is secured to the wall or other structure using one or more other means now known or later developed.

The expandable bracket includes opposed legs having opposed proximal and distal ends, the proximal end of each leg being coupled to respective opposed edges of the back plate of the Expandable Bracket such that the back plate and the opposed legs, together, define a channel. In some embodiments, the expandable bracket is moveable between a relaxed configuration and an expanded configuration, thereby facilitating movement of the keyboard assembly between an unsecured configuration and a secured configuration, respectively, when the enclosure is in an engaged configuration relative to the expandable bracket. In some embodiments, the expandable bracket prevents or otherwise inhibits the enclosure from moving away from the engaged configuration when the keyboard assembly is in the secured configuration. In some embodiments, moving the keyboard assembly to the unsecured configuration facilitates movement of the enclosure between the engaged configuration and a disengaged configuration, the enclosure being capable of being moved away from the expandable bracket when it is in the disengaged configuration. In some embodiments, the expandable bracket is part of an expandable bracket assembly comprising a biasing assembly having a biasing member that is moveable between a retracted configuration and a deployed configuration associated with the relaxed configuration and the expanded configuration of the bracket, respectively. In some embodiments, the expandable bracket is moveable between the relaxed configuration and a compressed configuration, such as by applying a biasing load on one or more leg of the bracket so as to move the legs towards each other, thereby facilitating movement of the enclosure between the engaged and disengaged configurations.

The foregoing and other objects are intended to be illustrative of the invention and are not meant in a limiting sense. Many possible embodiments of the invention may be made and will be readily evident upon a study of the following specification and accompanying drawings comprising a part thereof. Various features and subcombinations of invention may be employed without reference to other features and subcombinations. Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings, wherein is set forth by way of illustration and example, an embodiment of this invention and various features thereof.

BRIEF DESCRIPTION

A preferred embodiment of the invention, illustrative of the best mode in which the applicant has contemplated applying the principles, is set forth in the following description and is shown in the drawings and is particularly and distinctly pointed out and set forth in the appended claims.

Improved Enclosure

FIG. **1** is a front isometric view of a keyboard enclosure of an embodiment of the present invention.

FIG. **2** is a rear isometric view of a keyboard enclosure of an embodiment of the present invention.

FIG. **3** is an exploded rear perspective view of an embodiment of the present invention.

FIG. **4** is an exploded front perspective view of an embodiment of the present invention.

FIG. **5** is a perspective view of a first longitudinal edge of a PCB engaged with a longitudinal slot of a front shell of an embodiment of the present invention.

FIG. **6** is a sectional view showing a PCB engaged with end caps of an embodiment of the present invention.

FIG. **7** is a sectional view showing an indexing feature of a PCB engaged with an indexing feature of a front shell of an embodiment of the present invention.

FIG. **8** is a front view of a keyboard enclosure of an embodiment of the present invention with a keyboard overlay positioned on a front surface of the enclosure.

FIG. **9** is a front view of a button for a keypad membrane of one preferred embodiment of the instant invention in which multiple leads of different dimensions are utilized on the front side of each button.

FIG. **10** is a front perspective view of a keypad cover for a keyboard enclosure of an embodiment of the present invention.

FIGS. **11** and **12** are rear and front, respectively, plan views of a keypad membrane of an embodiment of the instant invention in which two parallel front leads are connected to each button/switch.

FIG. **13** is an exploded view of an embodiment of the present invention.

Mounting System—Shelf Bracket

FIG. **14** is a perspective view showing a first embodiment of a shelf bracket of the present invention.

FIG. **15** is a perspective view showing an enclosure engaged with the shelf bracket of FIG. **14**.

FIG. **16** is a top view of the bracket of FIG. **14**.

FIG. **17** is a side elevation view of the bracket of FIG. **14**.

FIG. **18**A is a rear elevation view of the bracket of FIG. **14**

FIG. **18**B is a front elevation view of the bracket of FIG. **14**.

FIG. **19** is a perspective view showing a second embodiment of a shelf bracket of the present invention.

Mounting System—Expandable Bracket

FIG. **20** is a perspective view of a first embodiment of an expandable bracket assembly of a keyboard assembly of the present invention, a bracket of the bracket assembly shown engaged with a back plate of an enclosure of the keyboard

assembly, the backplate being shown in a translucent state so as to show certain features associated with the keyboard assembly being in a secured configuration.

FIG. **21** is a front view of the bracket of FIG. **20**, the rear view being a mirror image thereof.

FIG. **22** is a side elevation view of a first side of the bracket of FIG. **20**.

FIG. **23** is a side elevation view of a second side of the bracket of FIG. **20**.

FIG. **24** is a top plan view of the bracket of FIG. **20**.

FIG. **25** is a bottom plan view of the bracket of FIG. **20**.

FIG. **26** is a sectional view taken from FIG. **20**, a biasing member of the bracket assembly shown in a deployed configuration and the bracket shown in an expanded configuration.

FIG. **27** is a sectional view similar to the sectional view of FIG. **26**, the biasing member shown in a retracted configuration and the bracket shown in a relaxed configuration.

FIG. **28** is a sectional view similar to the sectional view of FIG. **26**, the biasing member shown in a retracted configuration and the bracket shown in a compressed configuration.

DETAILED DESCRIPTION

As required, a detailed embodiment of the present invention is disclosed herein; however, it is to be understood that the disclosed embodiment is merely exemplary of the principles of the invention, which may be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriately detailed structure.

Keyboard/Keyboard Enclosure

Referring to FIGS. **1** through **7** a keyboard enclosure **10** of a first embodiment of the instant invention is shown. The keyboard enclosure of the first embodiment includes a front shell portion **12** and a rear shell portion **14**, each of which is preferably made of a lightweight, durable material, such as aluminum.

The front **12** and rear **14** shells are configured for selective engagement with each other, thereby defining a cavity **200** for holding one or more PCB **20**. In some embodiments, the keyboard enclosure **10** further includes one or more end cap **300**, such as a common end cap, a cable end cap, a battery end cap, or the like. In some embodiments, a first end cap **300** is configured to selectively engage with a first end of the keyboard enclosure **10**, thereby selectively enclosing the one or more PCB within the cavity **200**.

In some embodiments a profile of a first end of the front shell **12** defines at least part of a pass-through slot **15** for a ribbon cable **32** of a keypad **30** to extend. In some such embodiments, a first edge of the pass-through slot is defined by the front shell and an opposed second edge of the pass-through slot is defined by an end cap **300**. In this way, the ribbon cable **32** is secured within the pass-through slot **15** when the end cap is secured to the front shell **12** and can be readily moved into and out of the pass-through slot **15** when the end cap is disengaged from the front cap **12**. In some embodiments, at least part of the pass-through slot **15** is defined by the end cap **300**. In this way, more or less clearance for one or more ribbon can be provided by replacing a first end cap with a second end cap.

In some embodiments, the front shell **12**, the back shell **14**, and/or one or more end cap defines one or more speaker hole **17** extending into the cavity **200** of the keyboard enclosure **10**. In this way, sound is allowed to pass through the speaker holes **17** from a speaker mounted to the PCB **20** or otherwise located within the interior cavity **200** of the keyboard enclosure **10**.

The PCB **20** is configured to selectively engage with the first shell **12**, the second shell **14**, and/or one or more end cap **300** so as secure the PCB within the cavity **200** of the keyboard enclosure **10**. In some embodiments, the first shell **12** defines opposed longitudinal slots for selective engagement with opposed longitudinal edges of the PCB **20**. In this way, the PCB **20** is capable of selective engagement with the first shell **12** by inserting first ends of the opposed edges of the PCB into respective slots of the front shell **12** and sliding the PCB **20** longitudinally relative to the first shell **12**. In some such embodiments, one or more indexing feature **121** of the enclosure **10** provides an indication of when the PCB **20** is moved into a proper position. In other such embodiments, one or more feature of the enclosure, such as one or more feature of an end cap **300**, is configured to selectively retain the PCB at one or more position.

Referring to FIG. **5**, some embodiments of the first shell **12** define a longitudinal slot **120** and an opposed longitudinal ledge **122**. In some such embodiments, the opposed slot **120** and ledge **122** are configured to interface with opposed first and second longitudinal edges of a PCB **20**, respectively. In this way, the first longitudinal edge of the PCB **20** is capable of selective engagement with the longitudinal slot **120**, thereby allowing the second longitudinal edge of the PCB **20** to be rotated into selective engagement with the longitudinal ledge **122**. In some such embodiments, the first shell **12** includes one or more indexing feature **121**, such as a notch, associated with one or more indexing feature **21** of the PCB **20**, such as a light emitting diode, a speaker, or other feature of, extending from, or engaging with the PCB **20**. In this way, the PCB **20** can be positioned longitudinally relative to the first shell **12** prior to rotating the PCB into position. In some embodiments, one or more feature of the enclosure **10** is configured to selectively prevent the PCB from sliding along the longitudinal slot **120** and/or from rotating away from the longitudinal ledge **122**. In some such embodiments, the rear shell **14** includes a longitudinal ledge (not shown) that is configured to selectively engage with the second edge of the PCB **20** so as to prevent the PCB from rotating away from the longitudinal ledge **122** of the first shell **12**. In this way, the PCB is at least partially secured within the interior cavity **200** of the enclosure **10** when the rear shell **14** is secured to the front shell **12**.

In some embodiments, a first end cap **300** is configured to extend into the interior cavity **200** of the enclosure **10** when the first end cap **300** is secured to a first end of the enclosure **10**. In some such embodiments, a distal end of the first end cap **300** defines one or more slot **320** for selective engagement with a first end of the PCB **20**. In this way, the first end cap **300** is capable of preventing or otherwise inhibiting the PCB from moving longitudinally towards the first end of the enclosure **10**. In some such embodiments, a distal end of a second end cap **300** is configured to selectively engage with a second end of the PCB **20** so as to similarly prevent or otherwise inhibit the PCB from moving longitudinally towards a second end of the enclosure **10**. In other such embodiments, one or more feature of the front **12** or rear **14** shell and/or one or more other feature of the enclosure **10**,

first end cap **300**, and/or PCB **20** is configured to prevent or otherwise inhibit the PCB **20** from moving longitudinally towards the second end of the enclosure **10**. In some embodiments, one or more end cap **300** is configured to selectively prevent the PCB **20** from translating laterally and/or vertically and/or from rotating, such as rotating relative to a longitudinal axis of the keyboard enclosure **10**.

In some embodiments the front shell **12** defines opposed grooves **126** and the rear shell **14** defines corresponding opposed tongues **146** that are configured for selective engagement with respective grooves **126** of the front shell **12**. In this way, the keyboard enclosure **10** is moveable from a disassembled configuration to an assembled configuration by inserting a first end of the tongues **146** into a second end of the grooves **126** and moveable between an open configuration and a closed configuration by sliding the front **12** and rear **14** shells relative to each other. In some such embodiments, the shells are configured to slide relative to each other while a PCB **20** is positioned therebetween, thereby allowing for selectively enclosing the PCB **20** within the interior cavity **200** of the keyboard enclosure **10** and/or selectively removing the PCB **20** from the interior cavity **200** of the keyboard enclosure **10**. It will be appreciated that in other embodiments the front shell **12** defines opposed tongues and the rear shell defines opposed grooves and/or the front **12** and/or rear **14** shells define other corresponding features for facilitating selective engagement of the front **12** and rear **14** shells. In some such embodiments, the closed configuration of the enclosure **10** defines one or more open end, one or more such open end being configured to receive an end cap **300**. In other such embodiments, moving the enclosure **10** to the closed configuration includes moving a first end of the rear shell **14** into selective engagement with a first end cap **300** secured to a first end of the front shell **12** and/or moving a second end of the front shell **12** into selective engagement with a second end cap **300** secured to a second end of the rear shell **14**.

In some embodiments, at least one end cap **300** is a cable end cap defining a slot for selectively receiving a cable, thereby allowing the cable to extend into the interior cavity **200** of the keyboard enclosure **10**. In this way, the PCB **20** is capable of being in electrical and/or data communication with an outside source, such as a power grid and/or a computer system. In some embodiments, the cable end cap defines one or more feature, such as an S-channel, for selectively securing the cable, thereby preventing or otherwise inhibiting the cable from disconnecting from the PCB **20** and/or otherwise damaging the PCB. In some embodiments, the cable end cap defines a large void for receiving one or more loop of the cable, thereby providing slack so as to eliminate or otherwise reduce risk of damage to the PCB **20** and/or disconnection of the cable from the PCB **20**.

In some embodiments, the PCB **20** is capable of wireless data communication with one or more data source, thereby eliminating the need for a data cable. In some such embodiments, the PCB **20** includes one or more battery terminal, thereby eliminating the need for a power cable. In some embodiments, the PCB is configured such that the enclosure **10** must be in the open or disassembled configuration to remove, install, and/or replace batteries. In other embodiments, one or more end cap **300** is a battery end cap that is configured to receive one or more battery, thereby allowing one or more battery to extend towards the PCB **20** for selective engagement with one or more respective battery terminal. In some embodiments, batteries are removable by removing the battery end cap while the enclosure **10** is in the closed configuration. In some such embodiments, the battery end cap includes a battery door that is moveable from an open configuration and a closed configuration. In the open configuration, the battery door allows one or more battery to be removed from the enclosure **10**, installed in the enclosure **10**, and/or otherwise replaced. In the closed configuration, the battery door retains the batteries relative to respective battery terminals of the PCB **20**, thereby facilitating electrical communication with the PCB **20**.

In some embodiments, the battery end cap is configured to selectively engage a first portion of each battery, with a second portion of each battery extending freely from the battery end cap towards respective battery terminals of the PCB **20**. In this way, the battery end cap provides sufficient structure to position and align each battery with its respective battery terminal while eliminating or otherwise reducing the risk of one or more battery becoming lodged within the battery end cap. In some such embodiments, the first portion of the battery is two-thirds of the overall length of the battery.

In some embodiments, a front surface of the front shell **12** defines a recessed area **18** that is configured to receive a keypad **30**. In some such embodiments, opposed longitudinal edges of the recessed area **18** are configured to interface with opposed longitudinal edges of the keypad **30**, thereby preventing or otherwise inhibiting the keypad **30** from translating in a lateral direction when the keypad **30** is positioned in the recessed area **18**. In some such embodiments, opposed end caps each define opposed lateral edges of the recessed area, thereby preventing or otherwise inhibiting the keypad **30** from translating in a longitudinal direction within the recessed area **18** when the end caps are engaged with the first shell **12**. In other such embodiments, at least one lateral edge of the recessed area **18** is defined by the front shell **12**. In some embodiments, a top surface of the keypad **30** is flush with or is slightly offset below non-recessed portion of the front surface of the front shell **12**.

In some embodiments, the keypad **30** includes embossed buttons for each key, instead of metal domes. In some embodiments, the buttons are connected together in parallel and each button includes at least two front side leads. FIGS. **11** and **12** show an embodiment of the instant invention that includes two front side leads **38***a* and **38***b* to each button **34**. In the embodiment shown in FIGS. **11** and **12**, only a single back side lead **36** is connected to each button **34** (see FIG. **11**); however it will be appreciated that a plurality of leads may also be connected to the back side without departing from the spirit and scope of the instant invention. Referring to FIG. **9** another embodiment of the instant invention is shown in which four front side leads **138***a*, **138***b*, **138***c* and **138***d* are connected to each button **134**. In the embodiment shown in FIG. **9**, each front side lead for each button includes connection sections of four varying dimensions to create four different resistances during flexing caused by pressing of the buttons. This results in decreased wear on the connections.

In some embodiments, the keyboard **30** includes twenty (20) distinct keys. In some such embodiments, keys of the twenty-key keyboard are oriented in a 2 by 10 configuration and are in data communication with thirteen (13) distinct pins of a pin header of the PCB **20**. In other embodiments, the keyboard **30** includes thirty (30) distinct keys. In some such embodiments, keys of the thirty-key keyboard are oriented in a 3 by 10 configuration and are in data communication with fourteen (14) distinct pins of a pin header of the PCB **20**. In some embodiments, the PCB **20** is configured to selectively accommodate a twenty-key or a thirty-key

keyboard by selectively accommodating a thirteen-pin or a fourteen-pin receptacle of the keyboard, respectively.

In some embodiments, the keypad membrane **30** is covered by a cover membrane **40**. In some such embodiments, the cover membrane **40** includes one or more clear window section. The edges of the cover membrane **40** are secured to the front surface of front shell **12** and includes an open slot **45** to allow a keypad card **42** to be moved to (or away from) a first position by inserting (or removing) the keypad card **42** between the rear of the cover membrane **40** and the front of the keypad membrane **30** while the keypad membrane **30** is in a respective first position. In some embodiments, the keyboard is configured to retain the keypad membrane **30** in its first position while one or more keypad card **42** is moved between its first position and a second position. In some embodiments, moving the keypad card **42** to its second position comprises moving the keypad card **42** away from the keyboard, such as by sliding the keypad card **42** through the open slot **45** and away from the keypad membrane **30**. In some embodiments, the cover membrane **40** is configured to selectively receive one or more keypad card **42**, positioning the keypad card **42** relative to the keypad **30**. In some embodiments, the keypad card **42** includes numbers, symbols, words, etc. that associate with the function that is to be performed by the pressing of a key. In one embodiment, a keypad cover **48** (shown in FIG. **10** selectively engages with the keyboard enclosure **10** once the entire enclosure **10**, keypad **30**, and cover membrane **40** are assembled. In some embodiments, the keypad cover **48** is made of a polymer material that includes enough flexibility to allow the keypad cover **48** to snap around the assembled keyboard enclosure **10**. The keypad cover helps to protect the keypad **30** and the keyboard enclosure **10** and also allows the keyboard enclosure **10** to fit within a variety of different mounting brackets, such as those that are commonly used in the restaurant industry.

The present invention further includes methods of assembling a keyboard enclosure **10**. In some embodiments, the method includes moving a first longitudinal edge of a PCB **20** into selective engagement with a longitudinal slot **120** of a front shell **12** of the enclosure **10**, thereby restraining the PCB **20** in a first degree of translational freedom, a first degree of rotational freedom, and a first direction along a second degree of translational freedom. In some such embodiments, the method further includes positioning an indexing feature of the PCB relative to an indexing feature of the enclosure. In this way, the method includes positioning the PCB along a third degree of translational freedom, thereby providing positional references along each of the three translational degrees of freedom. In some embodiments, the respective indexing features restrain the PCB along the third degree of freedom while the first longitudinal edge of the PCB **20** is engaged with the longitudinal slot **120** of the front shell **12**. In other embodiments, one or more other feature, such as one or more feature of the front **12** or rear **14** shell and/or one or more feature of one or more end cap is utilized to position and/or restrain the PCB along the third degree of translational freedom. In some embodiments, the indexing feature is defined by one or more slot **320** defined by one or more end cap **300**.

The method further includes installing a rear shell **14** to the front shell **12**. In some embodiments, a second longitudinal edge of the PCB **20** is rotated towards a longitudinal ledge **122** of the front shell **12** prior to installing the rear shell **14** to the front shell **12**. In some such embodiments, a longitudinal ledge of the rear shell **14** retains the second longitudinal edge of the PCB **20** in close proximity to the longitudinal ledge **122** of the front shell **12**, thereby restraining the PCB in a second degree of rotational freedom. In some embodiments, the front **12** and rear **14** shells form a second longitudinal slot between respective longitudinal ledges, thereby restraining the PCB in a second and third degree of rotational freedom and further restraining the PCB in a second direction along the second degree of translational freedom. In other embodiments, one or more end cap **300** engages with one or more end of the PCB **20** so as inhibit or otherwise prevent the PCB **20** from moving relative to the front shell **20** in the first, second, and/or third degrees of translational and/or rotational freedom.

In some embodiments, the method of assembling the keyboard enclosure **10** includes engaging opposed tongues **146** of the rear shell **14** with corresponding opposed grooves **126** of the front shell **12** and sliding the rear shell **14** relative to the front shell **12** until a first end of the rear shell **14** is aligned with a first end of the front shell **12**, thereby moving the enclosure **10** to a closed configuration. In some embodiments, a first end cap **300** secured to the first end of the front shell **12** provides a stop for preventing the first end of the rear shell **14** from sliding beyond the first end of the front shell **12**. In some embodiments, a first end cap **300** is secured to the rear shell **14**, such as with screws extending through a rear wall of the rear shell **14**. In other embodiments, a first end cap **300** is secured to the front shell **12**, such as with screws extending through a side wall of the front shell **12**. In still other embodiments, the first end cap **300** is secured to the front **12** and rear **14** shells, such as with screws extending through respective side walls of the front **12** and rear **14** shells and/or through respective front, side, and/or rear walls of respective shells.

In some embodiments, the method of assembling the keyboard enclosure **10** includes engaging a first end of the rear shell **14** with a second end of the front shell **12** and sliding the shells relative to each other until one or more end of each shell is moved into a predetermined position relative to the other shell, such as by aligning respective first and/or second ends of respective shells. In some embodiments, a second end cap **300** secured to the second end of the rear shell **14** provides a stop for preventing the second end of the front shell **12** from sliding beyond the second end of the rear shell **14**. In some such embodiments, the second end cap **300** is secured to the rear shell, such as with screws extending through a rear or side wall of the rear shell **14**. In some embodiments, a second end cap **300** is further secured to the front shell **12**, such as with screws extending through a front or side wall of the front shell **12**, thereby locking the front **12** and rear **14** shells into relative position with each other.

Mounting System—Shelf Bracket

In some embodiments, the keyboard assembly includes a shelf bracket **500** for supporting an enclosure **10**, the shelf bracket **500** comprises a shelf member **510** for providing vertical support for the enclosure. In some embodiments, the shelf member is cantilevered from a back plate **530**, such as a back plate **530** that is configured to prevent or otherwise inhibit movement of the enclosure in an aft direction. In some embodiments, the shelf bracket **500** comprises a support flange **535** extending from the back plate **530** of the shelf bracket, at least one of the support flange **535** and the back plate **530** being configured to engage with a support structure so as to provide support for the shelf bracket. In some embodiments, the shelf member **510** extends in a first direction from a first edge of the back plate **530** and the support flange **530** extends in a second direction from a

second edge of the back plate **530**, the first and second edges of the back plate **530** being opposed to each other and the first and second directions being diametrically opposed to each other.

In some embodiments, the shelf bracket **500** includes one or more side flange **520**, such as a side flange extending from a back plate of the shelf bracket, each side flange being configured to prevent or otherwise inhibit movement of the enclosure in a respective lateral direction. In some embodiments, the shelf bracket **500** includes one or more front flange **525**, such as a front flange extending from a respective side flange of the shelf bracket, each front flange being configured to prevent or otherwise inhibit movement of the enclosure in a respective lateral direction. In some embodiments, the shelf member defines a cavity that is configured to receive an enclosure, such as by moving the enclosure in a vertical direction in and out of engagement with the cavity.

In some embodiments, one or more plate, flange, or other feature of the shelf bracket prevents or otherwise inhibits movement of the enclosure in one or more respective lateral direction without inhibiting movement of the enclosure in a vertical direction, thereby facilitating movement of the enclosure in and out of a cavity of the shelf bracket. In some embodiments, the shelf bracket comprises a shelf member defining a bottom limit of the cavity such that movement of the enclosure into the cavity is limited to a first vertical direction and movement of the enclosure out of the cavity is limited to a second vertical direction, the second vertical direction being diametrically opposed to the first vertical direction.

Mounting System—Expandable Bracket

Referring to FIG. **20**, in some embodiments, an expandable bracket **400** is included. In some embodiments, the expandable bracket **400** is intended to secure a keyboard enclosure in position relative to a wall or other structure, thereby providing a support mechanism for the enclosure. In some embodiments, the expandable bracket **400** attaches to an enclosure, such as by way of attaching to a rear shell **14** of the enclosure. In some embodiments, a mounting element, such as a back plate **430**, defines one or more attachment feature, such as a plurality of apertures **440**, for securing the Expandable Bracket **400** to a wall or other support structure, such as by extending a screw or other fastening means through the attachment feature and into the support structure. It will be appreciated that in other embodiments the expandable bracket **400** is secured to the support structure using one or more other means now known or later developed.

The expandable bracket **400** includes opposed legs **410**, **420** having opposed proximal and distal ends, the proximal end of each leg **410**, **420** being coupled to respective opposed edges of the back plate **430** of the Expandable Bracket **400** such that the back plate **430** and the opposed legs **410**, **420**, together, define a channel. In some embodiments, the distal end of each leg **410**, **420** defines a flange or other engagement feature **412**, **422**, such engagement features **412**, **422** being configured to selectively engage with an engagement mechanism of the enclosure, such as by way of engaging with a respective lip or other respective engagement feature of the engagement mechanism. In some embodiments, the engagement mechanism coupled to, defined by, or otherwise associated with a rear shell **14** of an enclosure.

In some embodiments the Expandable Bracket **400** includes one or more biasing assembly **450** for biasing the distal ends of the opposed legs **410**, **420** away from each other, thereby biasing the engagement features **412**, **422** of each leg **410**, **420** into engagement with a respective engagement feature of the enclosure. In this way, the Expandable Bracket **400** can be expanded into engagement with the enclosure, thereby moving the keyboard assembly to a secured configuration.

In some embodiments, the biasing assembly includes a biasing member **452**, such as is a screw or a bolt. In some embodiments, the biasing member **452** engages with a first leg **410** of the opposed legs of the Expandable Bracket **400**, such as a by engaging with a fixed member **454** of the biasing assembly **450**. It will be appreciated that certain embodiments of the fixed member **454** comprise and/or define a threaded aperture **414** defined by the first leg **410**, a threaded insert extending through an aperture **414** of the first leg **410**, a nut or other threaded item **454** coupled to the first leg **410**, and/or the like. It will be appreciated that in some embodiments the biasing member **452** defines external threads and the fixed member **454** defines corresponding internal threads such that rotating the biasing member relative to the fixed member causes biasing member to move between deployed and retracted configurations. In some embodiments, the fixed member **454** is positioned against an inner surface of the first leg **410**. In some embodiments, a distal end of the biasing member **452** engages with an inner surface of a second leg **420** of the opposed legs of the Expandable Bracket **400** when the biasing member is in the deployed configuration. In some embodiments, the distal end of the biasing member **452** is configured to engage with a recessed area **426** of the inner surface of the second leg **420**. In some such embodiments, an outer surface of the second leg **420** defines one or more boss such that the inner surface of the second leg **420** defines one or more respective recessed area **426**. In other such embodiments, the second leg **420** defines a first thickness at the center of the recessed area **426** and a second thickness adjacent to the recessed area **426**, the second thickness being greater than the first thickness.

In some embodiments, the biasing member **452** extends through a first leg **410** towards a second leg **420** with a distal end of the biasing member **452** being displaced from the second leg **420** when the biasing member **452** is in a retracted configuration. In some embodiments, moving the biasing member **452** from the retracted configuration towards the deployed configuration comprises moving the distal end of the biasing member **452** into engagement with the second leg **420**, such as by twisting a screw or a bolt. In some embodiments, the biasing member **452** is configured to expand the expandable bracket **400** by continuing to move the biasing member **452** away from its disengaged configuration while the biasing member **452** is in the deployed configuration, thereby moving the bracket **400** from a relaxed configuration to an expanded configuration. In this way, the biasing member **452** is configured to bias the opposed legs **410**, **420** of the Expandable Bracket **400** away from each other, thereby expanding distal ends of the legs **410**, **420** into engagement with a rear shell **14** of an enclosure so as to move the keyboard assembly from an unsecured configuration to a secured configuration.

It will be appreciated that in some embodiments moving the biasing member **452** to its retracted configuration enables the opposed legs **410**, **420** to move towards each other, thereby moving the keyboard assembly from the secured configuration to the unsecured configuration. In this way, the enclosure can be moved between engaged and disengaged configurations relative to the bracket. In some

embodiments, the enclosure is prevented or otherwise inhibited from moving away from the engaged configuration when the keyboard assembly is in the secured configuration. In some embodiments, the bracket is moveable from the relaxed configuration to a contracted configuration, such as by biasing the distal ends of the first and second legs towards each other, thereby facilitating movement of the enclosure in and out of engagement with the bracket.

In the foregoing description, certain terms have been used for brevity, clearness and understanding; but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such terms are used for descriptive purposes and are intended to be broadly construed. Moreover, the description and illustration of the inventions is by way of example, and the scope of the inventions is not limited to the exact details shown or described.

Although the foregoing detailed description of the present invention has been described by reference to an exemplary embodiment, and the best mode contemplated for carrying out the present invention has been shown and described, it will be understood that certain changes, modification or variations may be made in embodying the above invention, and in the construction thereof, other than those specifically set forth herein, may be achieved by those skilled in the art without departing from the spirit and scope of the invention, and that such changes, modification or variations are to be considered as being within the overall scope of the present invention. Therefore, it is contemplated to cover the present invention and any and all changes, modifications, variations, or equivalents that fall with in the true spirit and scope of the underlying principles disclosed and claimed herein. Consequently, the scope of the present invention is intended to be limited only by the attached claims, all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having now described the features, discoveries and principles of the invention, the manner in which the invention is constructed and used, the characteristics of the construction, and advantageous, new and useful results obtained; the new and useful structures, devices, elements, arrangements, parts and combinations, are set forth in the appended claims.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed is:

1. An enclosure assembly comprising a bracket assembly having a bracket, the bracket comprising:

a mounting element; and

opposed first and second legs extending from respective first and second sides of said mounting element, each of said first and second legs having a proximal end coupled to said mounting element and a distal end displaced from said mounting element,

a wherein said bracket assembly further includes a biasing assembly associated with each of said first and second legs,

wherein said distal end of said first leg comprises a first engagement feature,

wherein said distal end of said second leg comprises a second engagement feature displaced from said first engagement feature, and

wherein said biasing assembly is configured to bias said distal ends of said first and second legs away from each other, thereby biasing said first and second engagement features away from each other.

2. The enclosure assembly of claim **1**, wherein said mounting element defines at least one attachment feature for securing said mounting element to a support structure.

3. The enclosure assembly of claim **1**, wherein said biasing assembly comprises a fixed member associated with said first leg and a biasing member that is configured to engage with said fixed member, said fixed member defining a threaded aperture and said biasing member defining corresponding external threads.

4. The enclosure assembly of claim **3**, wherein said fixed member is positioned against and coupled to an inside surface of said first leg, and wherein said biasing member engages with said fixed member when the bracket is in an assembled configuration.

5. The enclosure assembly of claim **3**, wherein said biasing member is moveable between a deployed configuration and a retracted configuration, a distal end of said biasing member being configured to engage with an inner surface of said second leg when said biasing member is in the deployed configuration.

6. The enclosure assembly of claim **5**, wherein said inner surface of said second leg defines a recessed area, and wherein said distal end of said biasing member is configured to be received by said recessed area when said biasing member is in the deployed configuration.

7. The enclosure assembly of claim **6**, wherein rotating said biasing member in a first direction when said biasing member is in the deployed configuration causes said distal ends of said first and second legs to be biased away from each other, thereby moving said bracket to an expanded configuration.

8. The enclosure assembly of claim **1**, further comprising:

an enclosure having an engagement mechanism that is configured to selectively engage with at least one of the first and second engagement features of said bracket such that said bracket is configurable between an engaged and a disengaged configuration,

wherein moving said bracket to the expanded configuration when said enclosure is in the engaged configuration causes the enclosure assembly to move to a secured configuration,

wherein said bracket inhibits said enclosure from moving away from the engaged configuration when the enclosure assembly is in the secured configuration,

wherein moving said bracket away from the expanded configuration to a relaxed configuration causes the enclosure assembly to move from the secured configuration to an unsecured configuration, thereby facilitating movement of the enclosure from the engaged configuration to the disengaged configuration, and

wherein moving said bracket from the expanded configuration to the relaxed configuration comprises moving said biasing member from the deployed configuration to the retracted configuration.

9. The enclosure assembly of claim **8**,

wherein said first and second engagement features of said bracket comprise respective first and second engagement flanges extending away from each other,

wherein said engagement mechanism of said enclosure comprises opposed first and second lips extending towards each other, the first and second lips being positioned and oriented relative to each other such that a first width of the engagement mechanism is defined by distal ends of the first and second lips,

wherein said first and second lips define respective first and second slots that are configured to receive a distal end of respective first and second flanges when the enclosure assembly is in the secured configuration, the first and second slots defining a second width of the engagement mechanism, the second width being greater than the first width,

wherein a first width of said bracket is defined by said distal ends of said first and second flanges, and

wherein the first width of said bracket is smaller than the first width of said engagement mechanism when said bracket is in the relaxed configuration, thereby facilitating movement of said enclosure between the engaged configuration and the disengaged configuration.

10. The enclosure assembly of claim **9**, wherein the first width of said bracket is larger than the first width of said engagement mechanism when said bracket is in the expanded configuration, thereby inhibiting movement of said enclosure away from the engaged configuration.

11. The enclosure assembly of claim **10**, wherein moving the enclosure assembly to the secured configuration comprises moving said bracket into friction engagement with said enclosure.

12. The bracket of claim **8**, where when the bracket is in a relaxed configuration, the engagement features of the bracket are positioned relative to each other such that they define a first width that is larger than a corresponding second width of the engagement mechanism of the enclosure.

13. The bracket of claim **12**, where when the bracket is in a compressed configuration, the engagement features of the bracket are positioned relative to each other such that they define a third width that is smaller than the corresponding second width of the engagement mechanism of the enclosure.

14. An expandable bracket, said expandable bracket comprising:

at least two opposing legs, said legs connected via a proximal edge to a back plate; and

wherein said opposing legs each define an engagement element along their distal edges, and

wherein the distance between said engagement elements is less than the width of the back plate,

a biasing member interacting with at least one of said two opposing legs;

wherein said interaction occurs via one or more securing element associated with at least one of said two opposing legs.

15. The expandable bracket of claim **14**, wherein said engagement element is a lip.

16. The expandable bracket of claim **14**, wherein said securing element is a threaded hole.

17. The expandable bracket of claim **14**, wherein said securing element is a threaded nut attached to a surface of at least one of said opposed legs.

18. The expandable bracket of claim **14**, wherein said securing element is a recess associated with the interior wall of at least one of said opposed legs.

19. The expandable bracket of claim **14**, wherein said expandable bracket is configured in either an engaged or disengaged configuration depending on the positioning of said biasing member.

20. The expandable bracket of claim **19**, wherein said expandable bracket is considered to be in an engaged configuration when said biasing member interacts with both of said opposing legs.

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